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ABSTRACT

Undergraduate project work in a sample of British universities was investigated. After initial informal discussions with project supervisors and students, questionnaires were refined, and attention was focused on: project choice, project initiation, development and progress, staff/student relationship, assessment, and resources. Resources were one of the most important influences on the effectiveness of projects because of constraints on possible topics, availability of equipment for student use, and cost limits on each project. The research approach involved the following steps: contact with schools via the director of studies, contact with supervisors and supervisors questionnaire administration, contact with students and student questionnaire administration, series of meeting/interviews with supervisor/student throughout the course of the project, post-project meetings with staff and student, and second interview or meeting with student, where possible. It was found that not all schools offer a choice of projects to their final year students, and those who do not have a choice are usually involved in a design project where working as a team is part of the exercise. In some cases project topics originated in an industry problem, but usually the topics were related to a supervisors' own research interests. No two schools organized their final year projects in the same way and various kinds of grading schemes exist in different schools. Areas that appeared important to management/supervision of projects include: development of report-writing skills, care over the initial project stages, danger of oversupervision, presentation of possible topics, and availability of necessary resources. Case studies that illustrate project development and progress are appended. (SW)

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UNDERGRADUATE PROJECT WORK

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INTRODUCTION

A study of undergraduate project work. A simple title which belies the the complex nature of the subject. What actually goes on during a project and why? In this report it is hoped to reveal the inside view, to really get the feel of the project from both student and staff standpoint, but to do so without upsetting the balance of relationships existing and forming between student and supervisor.

In most schools within the university projects form part of the final year course. It is often only then that projects appear. It was therefore decided to investigate only final year projects. A second decision made was that projects from schools of science and engineering would be explored. It was though that projects which contained an element of practical work, as is most common in such schools, would show a broader spectrum of staff/student interaction and relationships then would those requiring only the use of the library.

To date most published work studying projects has examined them from the outside, with few authors concurring in the aims and objectives of projects and hence little, if any, agreement on the definition of a project, as is succinctly illustrated by Gabb (I979). Therefore in order (1) to take account of possibly differing aims and objectives within each school and (2) to study, in depth, each project under consideration, it was decided to cover only one or two projects from each school. Of necessity a considerable amount of time must be spent in getting to know the principals involved in each project and following their activities over the academic year, which was another reason for keeping numbers small and also avoiding the danger of generalised and possibly superficial conclusions. It was possible to increase the number of projects studied in the second year of the investigation as the methodology became more refined and because of the expertise gained in the primary year.

In both years of the study some of the students had industrial placement

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experience, others had not. Amongst those who had been into industry some encountered project work whilst others worked in more routine fields. The effect of their experiences on some of those who had encountered project work is quite enlightening, as will be shown later.

The students who were involved in the first year of study, tended be from the upper end of the ability range. Therefore in the second year it was attempted to involve a cross-section of the ability range by deliberately asking staff to approach less able students, where possible, to become participants in the investigation.

THE FIRST YEAR

(1) DEVELOPMENT OF METHODOLOGY

In attempting to formulate a methodology for investigating undergraduate project work it was of primary importance to appreciate what exactly a project entails. To do this informal discussion took place between the researcher and the Director of Studies of various Schools within the university. Each School has its own way of running a project but at this stage it was possible to construct a typical model (fig 1) of the "life" of a project which was true for the majority of schools involved.

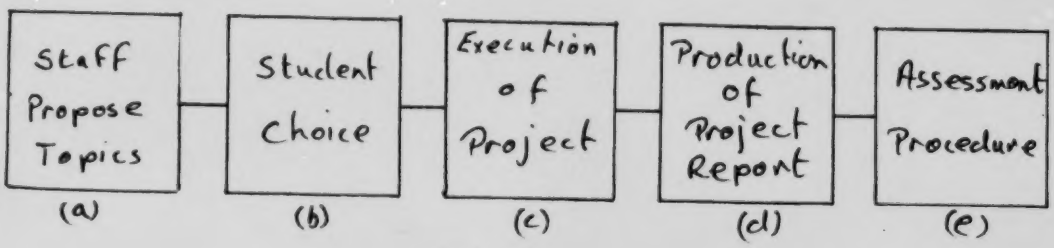


Fig 1

Fig 1 gives a simplistic picture of the life of a project, but as a basis it proved useful and will be expanded at a late stage.

Having established a model for the life of a project the next stage was to decide how to collect the right sort of data from staff and students. A previous study of projects (H. Good 1978) in one School of the university had used questionnaires for both staff and students (Appendix A I & II). These appeared to examine relevant areas concerning projects generally, so it was decided to use these questionnaires suitably modified, in the investigation, not necessarily as a source of raw data but to initiate discussion with the supervisor or student who had completed each individual questionnaire.

Contact was made with the project supervisors through the Director of Studies for each School. Where possible this initial meeting took place before the students returned to the university after the summer vacation, and therefore probably before the supervisor knew with which student or student projects he would be involved. For the purpose of this study it was important for the researcher to join the project 'life' by stage (B)

on Fig 1. (i.e. Student Choice) at the latest. It would be wrong to call the meetings held with supervisors something as formal as an interview for at this very early stage so much was to be learnt about the administration of projects within different Schools that it would have been presumptious to have questioned in any detail. It would be more accurate to use the term "informal discussion" and to foster the informality and flow of information a tape recording was made, with permission of all participants for analysis at a later stage. A criticism may be levelled that recording may inhibit the informality but during the course of this research very little inhibition was encountered.

Confidentiality was assured to all those taking part. This was laid down in the brief of the investigation.

The first discussion with supervisors gave more information on how each of them organised their own project students and also began to indicate some of the influences that modify the simple project model shown in Fig 1. As can be seen from Table 1, each school timetables a different number of hours ot its project. Table 1 also shows the possible marks to be gained in the projects as a percentage.

(i) for the final year

(ii) for the overall degree mark

It is interesting to note that despite great difference in the marks available between some schools. The verbal emphasis on the signifance of the project is an important feature of the course hardly varied.

School	Timetabled hours/year	Marks as % final year	Marks as % degree
A	154	30 (av)	25 (av)
B	154	16.7	11.5
C	42	11.4	8.4
D	308	20	20
E	154	6.67	5
F	308	31	20
G	160	16.7	11.5
H	175	22.8	16.9
J	259	28.6	14.3

Comparisions of timetable hours and available marks for final year undergraduate projects in various schools

Table 1

In some cases supervisors were involved in more than one project, but only one project from each supervisor was studied in the first year. Before contact was made with the students they were asked by their supervisors if they were willing to participate in this research. Unfortunately this usually precluded the researcher from being present at the first project meeting between supervisor and student, but in most cases contact was established within two or three days of this meeting. The students were asked to complete a questionnaire and recorded informal talks took place. An attempt was made to present at meetings between supervisor and student when the project was under discussion. Since these talks tended not to be pre-arranged it proved difficult, though where at all possible the researcher was present and the discussion recorded.

Talks with students and supervisors and visits to the students as they worked on their project continued on often as possible throughout the course of each project. Once the project was completed and the final examinations over, the overall reaction of the student to their project was sought, both by the researcher and another investigator who was familiar with the study but had not been directly involved with the collection of information. This was done in order to help check that the researcher had not inknowingly influenced the participants.

THE FIRST YEAR REVIEW

Points of interest rather than conclusion would probably be a better description of what is to follow, for as the pilot investigation progressed it became obvious that changes needed to be made on the basis of data collection.

The areas in which the points of interest frequently arose are

1) Project choice
2) Project Initiation
3) Developement and progress
4) Staff/Student Relationship
5) Assessment
6) Resources

Various features of project work fall under more than one of the above headings, but they are used to facilitate easy reference to particular stages of a project.

Project choice

It would appear to be a common feature that all students consider the potential supervisor of their projects as much as the topics offered, tending to approach supervisors with whom they have had contact and feel they know 'know' well enough to work with satisfactorily. This situation could well lead to certain members of staff being overloaded with project students and others having none at all - not just for one year but as a general rule.

Project initiation

A difficult time for students, but an area to be watched carefully but unobtrusively by supervisors. Ready availability of supervisors is an important aspect in this phase. Student capability does not always meet up with supervisors expectation at this time.

Project Development and Progress

As each project progressed so differently form every other one there is little to comment on except that those students who tried to work to some

form of schedule, of their own making or thrust upon them, did not seem to get quite so agitated towards the conclusion of their project work. Some of those whose projects was concentrated after final examination did have a 'couldn't care less' attitude towards the end, there is no doubt that though pressure can concentrate the mind wonderfully excessive pressure such as this can be overwhelming.

Staff/Student Relationship

Probably because of the consideration given by the students to their potential supervisors most of the relationships were harmonious. Even those students who had no choice of either topic or supervisor appeared to have no problems in this area, most staff being helpful and co-operative, others who were known to be not very helpful tended to be avoided. Where friction did occur it was not always obvious. The supervisor who imposed ideas upon a student or who laid down the way the project was organised was resented. The resentment was not open, the student realising that to oppose the supervisor would not improve the project marks and could well jeopardize his prospects.

Assessment

In an effort to standardise the assessment of projects some schools use a marking scheme of their own design, although the schemes are not always used in the way it is intended. Usually the students are made aware of the varying assessment procedures used, although it is debateable whether they remember much of the detail. The impression gained from some supervisors is that they question the validity of assessing projects because they are so different from traditional assessed work. It was suggested that a simple pass/fail system would suffice - but how do you allow for an outstanding project?

In only one school in this investigation was the project marked by the supervisor alone. All others used at least one other assessor or marker internally, naturally all projects were subject to scrutiny of the external examiner.

Whatever method of assessment was used the students felt it was reasonably fair, and some students remarked that to fail a project requires some effort

This last comment was also echoed by supervisors who also added that students were invariably given the benefit of the doubt in assessment questions.

Resources

Resources are one of the most important influences on the effectiveness of projects for the following reasons:

1) Constraints on possible topics

2) Availability of equipment for student use

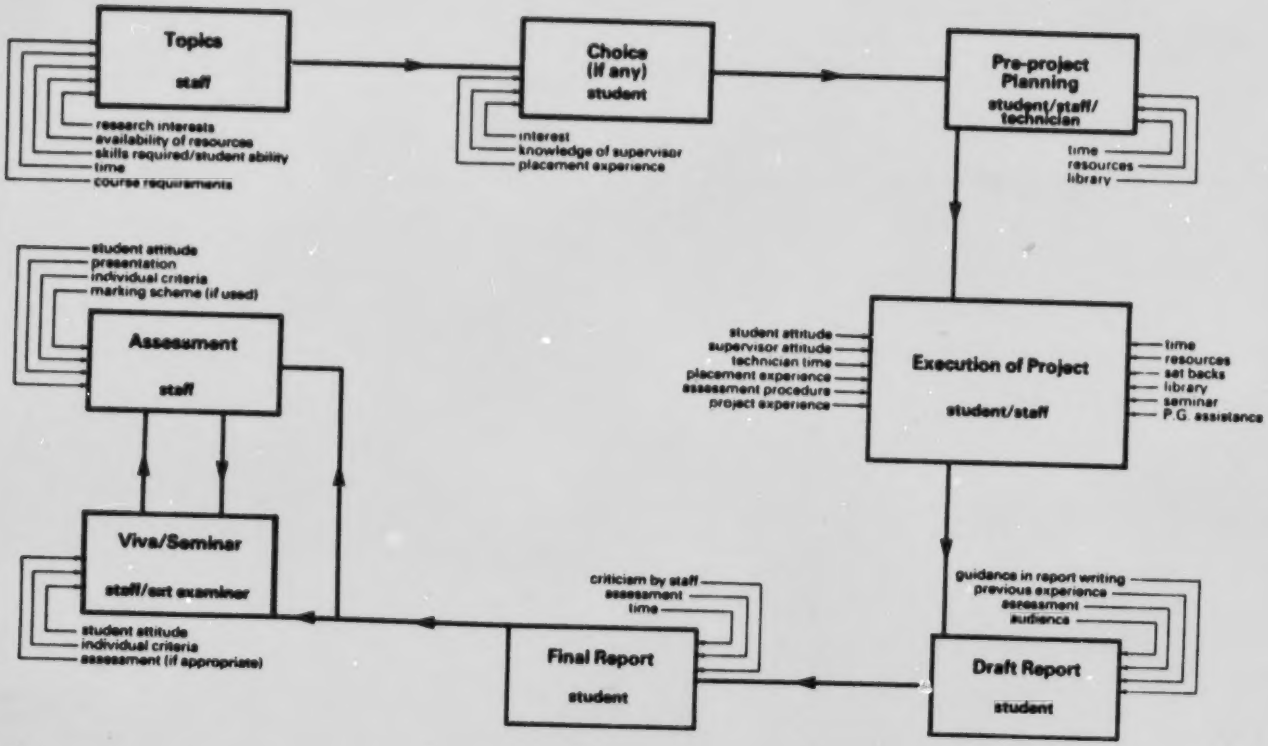
3) Cost limits on each project

This small list in fact covers a great deal, especially 2). It is possible that an individual supervisor could check on the availability of some equipment but there is often no way of establishing if it will be required by someone else at the same time, or over the same period. Further investigation is needed here.

Project Model

Having studied a number of projects over their 'lifetime' it was possible to reconstruct the model of a project life include all the influences that can be brought to bear at each stage. Not all influences are applicable to every project, nor is each stage necessarily present, but the representation in Fig 2. (overleaf) is typical for the majority of projects encountered.

A Scheme of Project Work



THE SECOND YEAR

(i) REFINEMENT OF INVESTIGATION METHODS

It was fairly early in the first year that it was realised that the questionnaires used were not entirely suitable for this type of inquiry. They were too long and, to some of the participants, rather obscure, although for use with large numbers of staff and students they could well produce interesting statistical data. The possibility of producing a new and relevant questionnaire for the first year was not feasible, and the reason for having a two year programme was to develop a method of investigation in the first year for application in the second.

Since the questionnaires were to be used as a foundation for interviews and talks with both staff and students the questions were kept fairly straightforward and did not always ask for reasons or answers in great depth. Examples of the revised questionnaires are shown in Appendix B I and II.

The questionnaire was the basis of the investigation. Other questions remained to be asked, these were based on the more complex model of a project "life" as shown on Fig 2.

With the changes outlined above the method of investigation was conducted as in the previous year, but with different supervisors and, naturally, different students. The procedure can be summarised thus:

1) Contact with schools via Director of Studies.
2) Contact with supervisors/supervisors questionnaire.
3) Contact with students/student questionnaire.
4) Series of meetings/interviews with supervisor/student as frequently as possible throughout the course of the project.
5) Post-project meetings with staff and student.
6) Second interviewer meeting with student (where possible).

The number of students, supervisors, and hence projects was increased in the second year, though by only a small amount so that the depth of understanding of each project was retained. Twenty five students and eighteen members of staff involved in a total of seventeen projects were initially involved. Two of the students changed their minds at an early stage and

decided to drop out, which all the students were free to do at any time. Thus the numbers involved in the second year were:

Staff	17
Students	23
Projects	16

It was possible to increase the numbers involved for two main reasons, firstly experience and familiarity with procedure meant that the investigation could be carried out more efficiently and secondly as one aspect covered in the first year was covered less fully: Resources. This important feature was the basis of separate investigation that developed a method of costing all resources used in an undergraduate project. (Harris and Bullock 1981).

It would be wrong to say that resources were ignored in the second year for their effect on the conduct of a project can be very significant, but they were not especially investigated.

The areas of interest identified in the first year of the study were found to serve well as a framework for the information collected in the second year. Thus the results of the investigation are presented under those headings.

In addition, as a result of the work done by Gabb (1974), the two questionnaires used by Gabb to look at student attitudes (Appendix B III) were administered to the students involved in this study.

THE SECOND YEAR

Findings:

Those taking part in the second year of the study had no problems with the questionnaires and the majority were completed and returned promptly. An anlaysis of the responses to the student questionnaire in Appendix B IV and to the staff questionnaire in Appendix B V. Reference will be made to various questions and responses at the appropriate stages later in this section.

In the spring the Attitude questionnaire was completed. The students were asked to assemble one Wednesday afternoon. It is encouraging to report that every student involved in the study at that time arrived and filled in one of the questionnaires. The 100% appearance of the students alone made it an interesting exercise, but in fact the questionnaire used is designed for large numbers so no significant fact emerged. (More details Appendix B III)

Facts, feelings and information about projects, the way in which they are managed, the constraints and influences which affect them were gathered from staff and students as described in an earlier section. Those points were often raised were summarized as follows under the headings already mentioned.

Project choice

Not all schools offer a choice of projects to their final year students, though where two projects are carried out at least one has an element of choice of topic available. Those who do not have a choice are usually involved in a design project where working as a team is part of the exercise.

All the students involved were or became enthusiatic about their project. For some it was their first opportunity of working on a problem with no known (to them) solution. Other students had placement experience of projects but were nevertheless keen on projects as a change from normal course work.

In most cases the students were given a list of topics from which to choose a project, the reason being that they should discuss a project outline with the member of staff who would supervise the project before making a final decision. In all but one situation where project choice was available, supervisor choice also took place. The exception was that of one student who explained ".... I was organised into this project without having a chance to discuss the others on my list...." This student was not unhappy with the project topic but had great reservations about the supervisor.

Other comments from the students were

".... I wanted to work with (supervisor) - I knew he would have the best topics...."

".... We didn't consider some (project topics) because of the supervisor...."

".... I like the idea of projects.... no one has done work on my project before...."

".... We gave as much thought to the choice of supervisor as to the topic...."

".... I wanted to do a topic with someone who seemed a reasonable person...."

".... I knew I could work well with him (supervisor)...."

".... I like the idea of being left to work very much on my own and I can go for help when ever I want it...."

".... there were some members of staff that I felt I couldn't work with.... I'm not the sort of person who wants someone looking over my shoulder all the time. In fact it puts me off...."

".... basically I enjoy doing my own work and I'd rather do it like this than have to attend lectures and things...."

".... I altered the project to fit me...."

The last comment is very significant: something similiar being said by a small number of other students. This shows that there was flexibility in some departments and by some supervisors who were willing to adapt their original project topics to fit in with the placement experience of a student.

In some instances project topics offered to the students have their origins in a problem from industry, but in the majority of cases the topics originate entirely from a supervisors own research interests or from ideas generated by papers in current literature. There are constraints which must be considered by staff when devising project topics:- space, availability of materials and equipment, cost and overall feasibility. Another constraint mentioned by some supervisors was that project supervision should not take up too much of their time. This aspect being very much dependent on the student/s involved. Those students who had no choice of project topic also worked in groups to which they were allocated. They made no comment on lack of choice available to them.

In only one school is the choice of project officially made before the start of the final year. It was found in other schools that in some cases students approached staff about the possibility of doing a project with them and occasionally staff mention to students that they would have an interesting final year project. These exchanges took place either on placement visits or in the term prior to the start of the final year.

Project Initiation

In the majority of the projects studied one of the students first tasks was to consult available literature. The supervisors usually provided the first leads. From the following comments is shown the variation in different

subject areas of the library facilities

"..... it's very difficult to find anything if you're doing something a bit different from the norm...."

"..... to be honest all the literature here is out of date...."

"..... the material is quite good! I was quite surprised...."

In parellel with the literature search came the setting up of the equipment required for any experimental work. This part of the project was, for most of the students, exasperating.

"..... I've spent the first couple of months just sorting out equipment and getting the stuff I wanted...."

This comment was fairly typical. Even students whose equipment was already available did not escape some frustration.

"..... first the rig was in use by someone else and was then out of action because something failed on it...."

Some students felt that their supervisors could have been more helpful in obtaining equipment.

"..... The technicians will give things to staff that they wouldn't let us (undergraduates) near...."

Project Developement and Progress

As each project studied was so different from every other details and comments on this stage are given in the individual case studies in Appendix C Case Studies A to U.

Staff/Student Relationship

As stated earlier the majority of students were as careful about choosing their supervisor as they were in choice of topic. Their idea being that once the project was under way they would be left to proceed in their own way, occasionally seeing their supervisors to let them know of any problems set books abd progress. Such were the students aspirations before the work began. In practise many of the students felt that guidance and help from their supervisors was lacking in the early stages, but conversely they did not want supervisors to be....

".... standing over us all and breathing down our necks...."

One comment being:

".... I'd go along to see (supervisor) and ( ) would say ' I'm too busy, I can't see you now'. (Supervisor) is better now I'm getting results and is interested, But in the early stages it was difficult to get hold of (supervisor) and thats when help was needed...."

One of the students, who claimed to enjoy working alone and whose supervisor was not often in contact, said:

".... It would be nice sometimes to have (supervisor) come up and say "What are you doing?" or "Don't you think you could do....". On the other hand I don't get pressed into things like some people do...."

It is the above type of statement that indicates that perhaps some students are not as independent and capable as they would wish to appear.

In general the supervisors involved in this study were pleased with the way their respective students went about their projects. Supervisor and student developed a good working relationship. Nevertheless some supervisors were rather disappointed with the standard of report presentation implying that higher standards of writing should be expected of final year students. Possibly the perception of what was required differed between student and supervisor.

Most supervisors warned their students of the dangers of spending too much time on their projects to the detriment of other studies. In fact one supervisor had to stop a student from doing more experimental work:

".... for his own good...."

so that what had been accomplished could be written up.

In order to get the most out of a project both staff and students emphasised the need for good relationship between each other. One student commented

".... You'd have to be very stupid to choose a project with a supervisor that you didn't get on with...."

"..... I assume it's not a good thing to fight with your supervisor...."

In one case, in this study, where the student did not choose the supervisor as much as the topics, the student felt pressured for most of the time doing only what the supervisor wanted. When the supervisor was away for some time the student was much happier with the project, but because of earlier experience, concealed results on the supervisors return. This led to problems in the writing up and a sense of anti-climax and frustration for both student and supervisor.

Assessment - Procedure

No two schools taking part in this appraisal organise their final year projects in the same way, neither do any of the schools follow the same assessment procedure for projects. Various kinds of marking schemes exist in different schools which require supervisors to complete printed forms at varying stages and at the completion of a project. Whether they are used as designed or 'made to fit' depends on the individual supervisor. Other methods are less formal, but all discriminative assessment falls into categories that may be summarized as

i) contracts
ii) related to objectives
iii) ranking
iv) romantic
v) performance

or any corbination of these, as described in Dowdeswell & Harris 1979 .

Some of the supervisors wondered whether it was valid that projects should be assessed, though they felt that without the associated assessment it would be difficult to incorporate them into a final year course.

According to most of the students involved in this investigation they were aware of how assessment was carried out in their various projects. It was apparent that some of the information the students had was inaccurate, particularly relating to the possible marks as a percentage of the total they could achieve for their project. Subsequently it was found that the students had obtained the correct information either from their supervisor or from other students. Whilst being aware of the danger of

becoming too involved with project work at the expense of other studies the majority of students were happy about the time they put into their projects and the marks they could possibly get out of it. One or two were not so happy, as one student remarked

> ".... I'm not sure the time and effort you put into it (the project) is worth the return in terms of marks - but it is good experience....".

Another look at Table 1 (page) gives further reinforcement to the above statement in some cases.

Resources

Few of the projects studied were free from problems involving resources. The degree of delay varied in the extreme, but the most common problem was tracking down the type of equipment needed to carry out the appropriate experimental work. The equipment involved was not necessarily of a highly specialized nature. Of necessity the students had to work through a technicians, who were generally helpful to project students. One comment was:

> "....There are so many people chasing after the technician. There's only one man and he is the one to see..... people got really cheesed off roaming around looking for things...."

One student was provided with a piece of equipment he did not realise he required by a technician. In another case a student went to Bristol to pick up a standard laboratory reagent or waste at least a week before it could be delivered. Those examples are extremes, but for them to occur frequently in such a relatively small group of case studies suggests that such events may occur quite often.

Another problem happily resolved a highly specialized item similiar to one used by a student on placement. Quite by accident the student discovered, from a member of staff unconnected with the project, that such a piece of equipment existed in that School and would be available for the project. The student remarked

> ".... it was incredible, no-one else seemed to know about it..."

Students who had project experience on placement found the provision of equipment and materials available for their projects disappointing.

> ".... We've been spoilt. On placement anything we required was ordered and provided within a few days...."
>
> ".... I've had no problems at all.... There are always people sitting round in the lab waiting for something they can't get..."
>
> ".... On placement equipment was always available, here you sometimes have to book in advance...."
>
> ".... the irritating thing, we've found is .... the department has only two meters of the accuracy we require and its not enough for everyone who needs them...."

Most of the students, when talking of problems involving resources, made the point that their colleagues were in similiar, if not worse, straits with their projects because of difficulties over equipment and materials. As one member of staff commented

> ".... they've just got to make the best of it...."

REVIEW & RECOMMENDATION

To attempt to make any generalised comments about the management and use of projects in the schools which have participated in the study would be rash if not to say reckless. Such a small number of projects have been investigated in comparison with the number carried out in each final year that it might be suggested to have been, a fruitless exercise. That is not so.

It is well known that students generally enjoy their project work despite the set backs and frustration that can occur. The students welcome the change from normal course work and the degree of independence they have over how they go about the work they carry out during the project. For the staff supervising projects it can be very rewarding or extremely hard work dependent on the student and the particular project. One underlying and crucial feature of a project is its assessment. Like it or not both staff and students can never forget that what ever else is said about the reasons for projects in the end assessment is carried out and the marks go towards the students final degree classification.

Many staff and students have commented on the validity of assessing projects and what is looked for in the execution of a project and its report when assessment takes place. Looking in Appendix B IV and V the responses given by staff and students to questionnaires shows some interesting differences. Staff in question 7 and 8 are asked how they assess a project and about their roles as assessors. The students in question 1 are asked what they think the staff are looking for when marking the project. For the staff the two most important features seem to be :

i) Presentation of the report
ii) Laboratory Performance

For the students the first two are:

i) Understanding if methods used
ii) Relevant and well designed experiments

It is perhaps possible to equate the second response of each group, but

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the students do not perceive report presentation as important. One must remember that small numbers are involved here, and should a much larger group be similiarly questioned the responses would perhaps be different. But on the point of reports most students claimed to have had little or no guidance on how to write up their project work other than in the form of a scientific paper. To emphasise this point many supervisors comment (in the case studies) that they have been disappointed in the standard of the reports they receive. It would seem that the development of skills in report writing is a subject that needs attention in the majority of Schools taking part in the study.

To return to the area of assessment, as can be seen in Table 1 (page) the differences in available marks for projects in different schools is quite startling. This information is also shown in a different form in the Staff Reponses Appendix B V question 6. These differences in themselves are not the concern of this study, but at the lower end of the scale one can hardly expect a student to over exert himself for a possible 3 or 4% of his degree mark how ever much he might enjoy doing a project. A more important point in the validity of giving a percentage mark for a project. It was suggested by one supervisor, amongst many who were concerned about assessing projects, that they might be grateful, as degrees are 1st 2 (i), 2 (ii) etc as a more equitable means of indicating the standard achieved in a project, for many aspects of project work cannot be directly qualified.

Perhaps one of the non-qualifiable aspects of a project could be its initiation. The starting up of a research project is not easy. Students who have had good placement experience are immediately at an advantage at this stage. For students who have not been so fortunate or who have had no industrial placement the beginning of a project can be quite an ordeal. It is possible that some staff feel that once a student reaches the final year he or she should be capable of almost anything. As can be seen in the case studies (Appendix C, A-U) these perceptions are not always true. Initiation of a project is an aspect not to be lightly ignored, as student performance or lack of it, in this area could influence project assessment at a later stage.

Many supervisors try to supervise projects that will not involve them in too much extra work. This may be a laudable idea, as long as they are fairly readily available to a project student with problems. There are other supervisors that become too involved in the porjects. So much so that the student feels it has been taken over. Undoubtedly this is unintentional, but is something to be wary of when supervising final year projects, for the question could be asked who, then is being assessed, the student or the supervisor?

Oversupervision is one of the points students bear in mind when choosing a project topic. Where choice is available most students consider the supervisor and the topic very carefully. Some potential supervisors are avoided as they are known not to be very helpful, and it is known that complicated wording of possible projects makes students steer clear, which can mean that some possible supervisors hardly ever have a project student. This can mean a heavy project student load for other members of staff. An indication of project load is given in Appendix B V question 5.

Another area of concern to those responsible for projects, be they in the final year or earlier years of a degree course, is resources. In a project that requires experimentation it is not only the strain on available equipment supplies, but the physical space required for that equipment to be set up and used satisfactorily. Some schools have overcome this problem by having pairs of students carry out projects. But in taking this step they have created a problem in another area - assessment. The problem of resources could easily be solved were an infinite amount of money and extra space available. Since such a probability is so remote as to be laughable then extra care must be taken when devising projects that the equipment required has a more than even chance of being available.

Summarizing, points deemed worthy of further consideration by those involved with the management and supervision of final year projects are:

1) Developement of report writing skills

2) Possible use of grades rather than marks

3) Care over the initial stages of a project

4) Danger of Oversupervision

5) Presentation of possible topics

6) Availability of necessary resources

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CASE STUDY A

78/79

Introduction

Standard Project Data

Analysis of Student Time

Project Choice

Development and Progress

Staff/Student Relationship

Assessment

Has Anything Been Gained?

Overall Impression

INTRODUCTION

This case study is an attempt to give a picture of the working of a final year undergraduate project, without going into the detail of the subject under investigation. For reasons of confidentiality the student is known as A_s and the supervision A_t. In this instance the student is particularly able.

Standard Project Data

Duration of project	2 terms	
Timetabled hours	154 hours/year	(1)
Possible Project Mark as a proportion of Final Year Marks	26-35%	(2)
Possible Project Mark as a proportion of Degree Marks	22-28%	(2)

(1) It is expected that students will spend more than the timetabled hours on their project.

(2) The variation in possible project marks is dependent on the number of electives taken in the final year.

Analysis of Student Time Spent on Project

This information was collected by the student completing a weekly log sheet showing the way in which his project work time was split up. The categories involved are shown in the table below. Weekly totals are shown in the extreme right hand column, category totals on the bottom line, and the overall total in the bottom right hand corner.

W/ending	Reading	Writing	Experimental (1)	Talking to supervisior	Talking to other students	Totals
5/11			14½			15
12/11			18½		2½	21
17/11			10½		1	11½
24/11			14	1	1	16
1/12			11½	½	½	12½
8/12	½		7½		1½	9½
~~5~~/12			6	1½		7½
12/1			17½	½	1	19
19/1			9		½	9½
26/1			18	2		20
2/2		3	8		½	11½
9/2		12	2½			14½
16/2		17½	4½	1	1	24
23/2		31½				31½
3/3		½	3	½		4
10/3		½	½			1
TOTALS	½	65½	145½	6½ (2)	9½	227½

(1) In this case Experimental = computer time.

(2) Supervision/Student contact was probably greater than indicated as many casual discussions took place.

PROJECT CHOICE

Student Comments	Supervisor Comments
A_s wanted to do a project with A_t as his supervisor because "He would have the best projects . . ." and "I would be doing something relevant to the work that the department was doing . . .". Having talked to A_t about the possibilities and having told him of some work already done on placement A_s found himself, as he put it, "lumbered" with a theoretical study in the field of his previous work. A_t would have preferred to do the practical aspect of the study but as he was so familiar with the subject he was not unhappy to have it as his project.	The students taking projects within this department are more often than not those who are expected to obtain first class honours degrees. They are usually people who have had some industrial experience prior to coming to University and are usually following a three year full time course. A_t comments that ". . . we are disappointed if our students get a 2(i). . .".
	A_t knew well of A_s's capabilities and wanted A_s to do a project for him and was pleased to be able to use the experience A_s had already gained in industry - it coincidentally being in a field in which A_t was greatly interested.

DEVELOPMENT PROGRESS

STUDENT COMMENTS	SUPERVISOR COMMENTS
Although the title of the project A_s is doing was long ago agreed, the actual definition of the problem and the boundaries in which to work were very hard to extract from A_t. A_s did not want to get fully into the work only to find the emphasis was wrong and that he would initially have to start again - he knows that this has happened to other students in earlier years. Having had experience in a directly related field, A_s knew how to approach the problem and what he had to do. The only difficulty arose in the way in which the computer operates which resulted in more time being taken to de-bug the program than was either expected or necessary. Once the de-bugging was completed the program was transferred to a telephone linked computer, which was more satisfactory - but could only be used at certain times of day - i.e. cheap rate times only. Everything has its drawbacks. The work had to be done in conjunction with the students doing the practical side of the study, but this was not altogether satisfactory as it took them some time to become as well up in the system as A_s. Because A_s had progressed so well he was told by A_t to stop any further work on the programme development and to start writing up, even though their were still a few weeks of "project time" still to go. A_s was pleased to start writing up as he was sure it could be done well before exam time, however he was not really looking forward to it.	Once the project definition was confirmed A_t was happy to leave A_s to carry on with the development himself, and was pleased with the way he did so. A_t was given infrequent but satisfactory progress reports by A_s and decided by the middle of the Spring term that A_s had done more than enough therefore he told A_s to stop further development and begin writing up.

STAFF STUDENT RELATIONSHIP

STUDENT COMMENTS	SUPERVISOR COMMENTS
A_s is pleased to be working with A_t as his supervisor and is in accord with his philosophy of not bothering A_t unless it is really necessary. It would appear that A_t is sometimes difficult to work with . . . "As long as you keep on the right side of him he's alright . . . he likes putting people down at times; as long as you can put up with that . . . I suppose its his privilege really," but A_s seems to be quite happy about the situation and it would appear to have worked out satisfactorily.	According to A_t, A_s is a typical 'good' student putting a great amount of work into all his activities. It is this type of student that A_t likes to have doing projects with him as they tend to get on with them and not bother him unduly. Rather quixotically A_t says that he has more time for this type of student than those less capable as he gets quite a fair amount of motivation from, say, A_s, which prompts him to motivate A_s more - this A_t finds most stimulating. So well has this project gone that A_t finds himself constrained to protect A_s from himself as he had to stop him from doing any more work on his project. " . . . he is doing too well - hed'd get over 80% for his project as it is now . . ." A_t also said that such was the standard of work that A_s was producing that should be continue for the time allowed A_s would undoubtedly produce the equivalent of a good MSc thesis at the end of his project.

ASSESSMENT

STUDENT COMMENTS

" . . . its a very vague business, they're not very clear how they work." This was the first comment made by A_s on the marking procedure used for final year projects in this department. A_s knows the staff use a marking grid but thinks that the supervisors tend to give marks depending on the class of degree they think the student deserves and make the system fit that rather than the other way round. This is particularly true of A_t, according to A_s, as it fits in with his attitude towards projects. Despite this bending of the rules A_s believes the system to be fair because unless a student is "very stupid" he doesn't choose a project or supervisior where a personality clash may occur or where some antagonism may exist neither does he think that a student would gain because he gets on particularly well with his supervisor.

Another point made by A_s was the temptation to become too involved in a project to the detrement of examinable subjects in an effort to gain very high marks. This can happen all too easily since the final year project is often the first introduction to research and investigative work and is hence so different and enjoyable compared to other course work it is easy to be carried away.

SUPERVISOR COMMENTS

A basic marking scheme is used which is designed to give a range of marks within which the project mark will fall. An allowance is made for slight adjustment up or down, but this is only used after the marking scheme has been completed. It would appear that A_t is not altogether in accord with the use of this marking scheme. He is more inclined to decide on an approximate mark then fill in the marking grid accordingly. The repor is read by another member of the staff, the internal examiner, before the final mark is decided upon, and often the supervisor will have a discussion about the project with him before they come to a decision.

Students are aware of the marking scheme.
A_t was very pleased with the way in which A_s had approached and worked through his project. The final report was not as well written as it could and perhaps should have been, it does not reflect either A_s's ability or the academic effort put in. It is really too long and it would seem that A_s became bored with writing and correcting it. A_t envisaged some trouble with the internal examiner and did have to have a prolonged discussion with him, finally agreeing on a mark of 83%. There is no doubt that had A_s made more of an effort in writing up, he would have gained considerably higher marks.

A_s received a first class honours degree.

HAS ANYTHING BEEN GAINED

The purpose of a project is to learn how to go about research work and the limitations and discipline needed to carry it out. This is the definition A_s gives. He believes projects are a necessary part of the course especially for students with limited, if any, industrial experience. For students, like himself, with a fair amount of industrial experience, projects are not the eye openers that they can be to others, and, A_s thinks, are of no practical use other than acquiring an in depth knowledge of a very small section of the subject.

Overall A_s quite enjoyed his project but would have preferred to have carried out the practical side rather than the theoretical study, but as it was nearly a straightforward continuation of his industrial work he hasn't really gained much.

OVERALL IMPRESSION

A_s is a very capable and sensible student who would do very well in anything he tackled. It would seem that he chose his supervisor first and was not unduly worried about the topic for his project. The fact that he ended up with a theoretical study was a bit of a disappointment but nevertheless he made a good job of it, though the disenchantment crept back in during the writing up of the final report as is obvious by his supervisor's comments. For A_t the experience and capability of A_s were just what he liked in a student doing a final year project, especially since he was able to exploit A_s's expertise in a new area of his own interest. A_t's disappointment with the final report that A_s produced was tempered by the knowledge of the other pressures upon A_s at the time and it is possible he knew that A_s would have liked to have done a practical study.

The relationship between A_s and A_t was very good. A_s was aware of the difficulties in working with A_t who was in turn aware of A_s's capabilities and did his best to stretch, not from a selfish point of view, but only to make A_s aware of them too. A_t was the only supervisor who positively commented on the stimulation he received from working with one of his project students. It would seem that this project ran very well from start to finish, but it is atypical. The frequency of theoretical projects in this department is very small, the type of rapport that existed between A_s and A_t would again not often be encountered. However, as with most things a point of criticism exists. It is the virtual non-use of the library. The subject of this project is very new, so the lack of literature of direct relevance is understandable, but this lack of library activity appears to be of long standing. It would perhaps be expected that a student of 1st class calibre would be more likely to make use of the library than those less able, if this is not so and the library is rarely used by any ug's on this course, there must be some lack of liaison somewhere.

CASE STUDY B

79/80

Introduction

Standard Project Data

Time Spent

Project Choice

Development and Progress

Staff/Student Relationship

Assessment

Has Anything Been Gained?

Overall Impression

INTRODUCTION

This picture of a project involves two students from the lower end of the ability scale in this department. For this reason, they carry out two projects, each being of 1 terms' duration. Only one of their projects is covered here, it being the one tackled in the first term.

For reasons of confidentiality the students are known as B_{s1} and B_{s2} and their supervisor as B_t.

Standard Project Data

Duration of Project	1 term	
Timetabled hours	77 hours/term	(1)
Possible Project Mark as a proportion of Final Year Marks	16.7/2%	(2)
Possible Project Mark as a proportion of Degree Marks	11.5/2%	(2)

Projects in this department always carried out by pairs of students.

(1) It is expected by the staff that students will spend more than the timetabled hours on their project.

(2) In this case 2 x 1 term projects are carried out thus total possible project Marks are:

Final Year	16.7%
Degree	11.5%

Time Spent by Students

Although they expressed a willingness to keep a record of the time they spent on their project, when asked to produce them these students come up with all sorts of excuses for not having done so. It must be stressed that there was no pressure put on them in any way, and it may be that as they tended to work on the apparatus individually and at odd times that they had forgotten the time that they had spent.

PROJECT CHOICE

Student comments	Supervisor comments
By the time B_{s1} and B_{s2} had got round to choosing a project there was not much left and it seemed they had little real enthusiasm for anything. One of the students did say, "I wanted to do a project with someone who seemed a 'reasonable' person, not to keen on only academic affairs. For this reason they approached B_t. There was also the added advantage that there was no rig building involved. Their project was to be carried out on a factory built sealed unit which required only power and water connection.	The piece of apparatus involved in this project is new and therefore it appeared to B_t to provide for a pair of under graduate students, thus providing data required for its future use. B_t had decided on a number of sets of results that he would like, and depending on how the students got on with the apparatus they would be able to get some or all of them.

DEVELOPMENT AND PROGRESS

Student comments	Supervisor comments
B_{s1} and B_{s2} were given a list of things to do with the apparatus and the order in which to do them. They were not told exactly how to obtain the results, though they were provided with a great deal of relevant data relating to the fluid they are using. Both B_{s1} and B_{s2} were happy about what they had to do and felt confident that they would be able to carry it out.	Because this was a new rig the students were told not to worry if they did not get through everything that had been listed for them. B_t did not know how long it would take to get the rig set up and working properly. At the very start B_t went down to the rig with B_{s1} and B_{s2} to explain the principle behind the rig and the proposed experiments he wanted them to carry out. Explicit instructions were not given - but the importance of the various instrumentation and necessity for allowing steady state to occur was stressed.
The feeling of confidence evaporated as problems developed with the apparatus but with help from other members of staff as well as B_t the students thought they had sorted it out and happily continued taking readings and getting results. B_{s1} and B_{s2} submitted a draft report to B_t with the idea of doing the final report over the	As time went on it became obvious to B_t that B_{s1} and B_{s2} had no experimental expertise at all "one of them (students) came to me with a problem that didn't exist - I suppose that should have triggered me to their attitude".

Student comments	Supervisor comments
vacation. This did not quite work out as they had hoped as their results were not as good as they had thought and their supervisor wanted quite a lot of the report rewritten.	B_t became rather concerned about the attitude B_{s1} and B_{s2} had towards their project and when on going through their results with them, prior to their writing up, he found discrepancies in two sets, which should have been identical, varying from a factor of 2 to a factor of 10. Rather alarmed B_t decided to do a check run on the rig, which showed that the students could not have been letting the rig come to steady state and that one of the instruments was incorrectly calibrated. It was difficult for B_t to check up on B_{s1} and B_{s2} as they worked on the rig at different times, usually by themselves. There is no doubt, says B_t, that they spent a lot of time on the rig and no doubt felt very busy and hard-worked, it was unfortunate that they did not inquire enough in to what they were doing to attempt to make any explanation of their results.

DEVELOPMENT AND PROGRESS

Student comments	Supervisor comments
	The report that was submitted needed to be re-written, despite the fact that B_t gave the students a very good idea what should be included, as he said, "I can't write it for them".

STAFF/STUDENT RELATIONSHIPS

Student comments	Supervisor
B_{s1} and B_{s2} were quite happy to work with B_t as their supervisor as they had come into contact with him in previous years and felt that he was the right sort of supervisor for them. He could not always be found when they felt they needed his help, but was generally fairly accessible. They found that B_t was a bit more particular about their report than they had anticipated, but that was to a large extent their own fault.	In the early stages B_t was encouraged by the effort and time that B_{s1} and B_{s2} were putting into their project. It was not until he looked at their results that he realised that they did not really understand what they were doing. On pointing out discrepancies B_t asked the students what they had done to discover the course, one said, "Nothing", and the other said it was due to corrosion. To say that B_t was disillusioned is an under-statement.
	The contact that sutdents and supervisor had was not great - neither was it non-existant. However, B_t tended to blame himself for the performance of the two students, and for not realising their attitude at an earlier stage, it was now painfully obvious that they expected to be "spoon-fed". B_t did say that this attitude was not uncommon, but

Student comments	Supervisor
	in the case of these particular students was taken to the extreme.
	When their final report was handed in B_t was still not very pleased with it despite the extensive modifications and additions he had suggested to them.

ASSESSMENT

Student comments	Supervisor
Both students knew that a marking scheme was used. Neither claimed to know how if worked or what proportion of marks were allocated to the project, nor did they seem to care unduly; "its written down somewhere" one of them said.	A marking scheme is used the outlines of which is known to the students. Marks are split up into the following areas, carrying out, draft report, final report. Depending the the nature of the project the 'carrying out' marks may be further sub-dividied. B_t considered the assessment of the effort put in by B_{s1} and B_{s2} very carefully. There is no doubt that they were not as careful as they could have been and perhaps the supervised should have been more stringent, added to which they were the first people to use the rig therefore the marks given to them worked out at about 45%. B_{s1} received a 3rd class degree. B_{s2} received an unclassified degree.

HAS ANYTHING BEEN GAINED

As far as experimentation skills are concerned B_{s1} and B_{s2} learnt virtually nothing. The greatest gain to them has been a good idea of how to write a proper report - though in theory this had already been covered.

B_t is a bit more wary of students doing one term projects, but in fact, some important features about the rig have been discovered, though not by the students who should have found them.

OVERALL IMPRESSION

It would appear that B_{s1} and B_{s2} were going through the motions of doing a project, they did not seem to have any real interest or desire to investigate the problem with which they were confronted. They thought B_t was an easy going supervisor who would not bother them too much and that if they appeared to be busy and handed enough pieces of paper in at the end then they had done what was required. There is no doubt they put the time in, but they did not listen to what their supervisor told them about the central of their rig, which from the point of view of their results was disasterous. Had it not been that their supervisor felt unsure about the information he had given them, then undoubtedly they would have struggled to reach the pass mark.

In fact all the information they required along with cautions about the instrumentation was given to them, verbally, when they first had a look at the rig. It is not to be expected that final year undergraduates should have to have things explained to them in words of one syllable, but that is obviously what these two students expected. It is not surprising that their supervisor was highly disillusioned with students by the time their project ended.

The self criticism felt by the supervisor was not really justified, though understandable, the students too should make themselves available on the appropriate (timetabled) days. A project is two-way effort and usually is, but this was a real exception.

CASE STUDY C

79/80

Introduction

Standard Project Data

Student Time

Project Choice

Development and Progress

Staff/Student Relationship

Assessment

Has Anything Been Gained

Overall Impression

INTRODUCTION

The picture of a project described here involves a pair of average-ish students who, by what they consider to be slightly unconventional means, manage to achieve much more than was expected of them in their project. Such was their standard that it resulted in one of them being awarded a higher classification of degree.

For reasons of confidentiality the students are referred to as C_{s1} and C_{s2}. Their supervisor as C_t.

STANDARD PROJECT DATA

Duration of Project	2 terms + 3 weeks after exams	
Timetabled hours	259	(1)
Possible Project Mark as on preparation of Final Year Marks	28.6%	
Possible Project Mark as a preparation of Degrees Marks	14.3%	

(1) It is expected that students will spend more than the timetabled hours on their project.

STUDENT TIME SPENT ON PROJECT

In this instance the time spent on the practical aspects of this project was restricted to the timetabled hours, with the addition of Wednesday afternoons, because of the shortage of bench space within this department. The students did attempt to keep records but abandoned the effort after a week or so as they felt that too many inaccuracies were creeping in. It was not part of this investigation to extend any pressure on the students to keep such records.

PROJECT CHOICE

Student comments	Supervisor
A list of project topics was given to the students from which, after discussions with the various supervisors, they were to choose the project they wished to do. C_{s1} and C_{s2} looked at two or three projects on the list and talked to the different supervisors before making their decision. Said C_{s1}, "We gave as much thought to the choice of supervisor as to the project topic. We knew we'd want someone we could work with". The students were fortunate enough to do the project and have the supervisor that was their first choice, they said that the final choice was between supervisors rather than topics and they felt that C_t would be more accessible than their other potential supervisor.	The project topic in this department is an important feature, it brings together the different parts of the subject, which are taught seperately and makes the student realise that in the real world problems do not necessarily involve just one aspect of the subject area. It is the breaking down of these artificial barriers, for which perhaps the department is responsible, that is one of the prime functions of the selection of a good project topic. About half the project topics offered in this department are directly related to on going research work, though C_t emphasises that these are not always the best for the student who is often reduced to the role of research assistant who has been told which measurements to

Student comments	Supervisor
	take and how to take them. Other topics, such as the one in this project, are the results of ideas from various members of staff and are usually of the one-off variety, as is this one. It is often the case that a 'one-off' project is more beneficial to the students as they are introduced to the realities of tackling a research problem from scratch where as those related to the research group are not so demanding.

DEVELOPMENT AND PROGRESS

Student comments

The early stages went well and C_{s1} and C_{s2} soon developed a good working relationship despite C_{s2} not really liking the idea of working in a pair, as he said, "I'm not particularly happy about it, I prefer working on my own - but thats just me. I feel some what responsible for my actions in that I'm affecting someone elses' degree as well as my own". Having set themselves a 'sort of schedule' they were pleased to find that by the start of the second term they were keeping up well in comparison with some of their colleagues doing other projects. Some set backs have cccurred, usually lack of equipment on the non-availability of certain highly accurate measuring devices essential to their method of work.

With any problems that occurred

Supervisor

The students got off to a good start and seem to be very enthusiastic. There were no problems in getting them to work at their project. There are a lot of separate parts to this project and initially they decided to work on each part together, but they soon found it better to work on one piece each, while involving each other in every decision - whether this happened by accident or design it was difficult to tell but their working relationship was very good.

As the project progressed the students kept well to their time scale and C_t said, "I'm very pleased indeed, its worked out better than I had realistically hoped", C_{s1} and C_{s2} had done more than had been expected and had tackled it in a more adventurous fashion than C_t had anticipated, contributing many original ideas, thus making the job of supervision much easier.

DEVELOPMENT AND PROGRESS

Student comments	Supervisor
C_{s1} and C_{s2} would discuss them thoroughly and if they could not resolve them, approached C_t with their possible solutions - whenever any decision had to be made this approach was used which meant that both students knew exactly what was going on at each phase of the project. Though they might each have been working or different aspects. Assistance was readily forthcoming from all members of staff that were approached, as well as from their supervisor as they pointed out there were some staff members that they avoided!	They reached an area of investigation that is still very new, few people have experience in it so that their project work can only be good for their future careers.
	As a team C_{s1} and C_{s2} were one of the best that C_t had come across in project work, they adopted complementary roles, but never failed to keep the other partner informed of developments, in this way they both had a very good understanding of all that went on throughout the project.
At the very start of their project C_{s1} and C_{s2} had agreed with C_t that it may be that they would not complete the whole project and therefore a number of 'stopping points' were agreed, but had it not been for a last minute problem	C_t felt that much of the work the students had done in the early stages of their project could well have been written up, but he realised that with pressures of exams that it had been put off. He was not unduly worried that he had seen nor heard anything about their writing up plans.

Student comments

over which neither students nor supervisor had any control they would have completed the experimental work totally. It would seem to have surprised C_{s1} and C_{s2} somewhat that this should have happened. They put it down to the fact that they were not 'normal' students, and refused to take the course and project too seriously "for our own sanity", said C_{s2}.

Both students found it a little difficult to settle back into their project work after the break for their final examinations, but once they had done so were eager to finish off as soon as was practical. Despite this they left the writing of their reports until the very last minute and completed them hurriedly, though not in a panic, C_{s2} deciding to type his as, he said, no one could read

Student comments

his writing. C_{s1} and C_{s2} did not submit a draft of their report to C_t, but did discuss it with him before handing it in.

STAFF/STUDENT RELATIONSHIPS

Student comments	Supervisor
As mentioned earlier C_{s1} and C_{s2} deliberately chose C_1 to be the supervisor of their project they believed, from previous experience, that he would be easy to work with and, just as important, fairly accessible. In fact they found that C_1 was friendly and helpful and not too 'pushy'. In the later stages of the project C_{s1} and C_{s2} had cause to try to see C_t individually. C_{s1} continued to find C_t easy to get along with, accessible and with plenty of time to spare for him and his problems. C_{s2} however found C_t "an annoying sort of person - at least I find him so - he's very precise all the time and he always seems too perishing busy!" C_{s2} felt that perhaps C_t had too much to do to spare the time for project students, but this may well be due to C_{s2} and his highly extrovert character, which without the moderating influence of his partner C_{s1} could be quite over-	C_t was very pleased with the enthusiasm shown by C_{s1} and C_{s2}. The fact that they got on with the work without having to be chased up made his job as supervisor much easier; as he said "....my role has been reduced to that of a friendly uncle rather than a stern father ....". As a project team C_{s1} and C_{s2} were one of the best that C_t had come across, and they were very easily balanced in that neither took the lead in discussions all the time but both contributed on an equal basis.

Student comments

whelming.

The fact that the students had to work in pairs was not to C_{s2}'s liking. He very much wanted to work on his own and enjoyed doing so. "...I can make my own decisions and take full responsibility for them..... it wastes so much time having to discuss things". This did not mean that C_{s1} and C_{s2} did not work well together, C_{s1} was quite happy with the arrangement having worked with C_{s2} in previous years and C_{s2} said that he worked as well with C_{s1} as he could possibly do with anyone, they were friendly on a social level as well as partners in their academic life.

Both students said that when ever they went to see their supervisor they made a point of having some sort of results to tell about,

Student comments

either positive or negative; as C_{s1}, said, ".....it showed we'd been doing something". Although they were fairly certain that they had chosen a good supervisor C_{s1} and C_{s2} thought it necessary to try to impress C_t and to follow his suggestions whenever possible.

ASSESSMENT

Student comments	Supervisor
The assessment procedure was explained to the students, according to C_{s1}, but neither C_{s1} nor C_{s2} could remember much about it in the early stages of their project. They were under the impression that the project mark was unlikely to affect their final degree classification except in extreme borderline cases and therefore they should not neglect their academic subjects in favour of the project. An assessor was appointed just after the start of the project who may, or may not, become involved in their project as it progressed. In the case of C_{s1} and C_{s2} it turned out to be their personal tutor, which as they said had both advangages and disadvantages, but they did get on with him well.	The project is used as a form of assessment, to quite a substantial degree, $^1/_7$ of the total marks, but is assessing qualities other than those tested in formal examinations. Three people are involved in the assessment. The supervisor who has one third of the available marks to award for the carrying out and final project report. The assessor, who has one third of the marks to award on the report and viva, the final third being awarded by the chairman on the viva alone.
As the time for handing in the	C_t was very pleased with the way in which C_{s1} and C_{s2} carried out their project work though he was a little disappointed with the reports. C_t commented "they weren't polished ..... one is looking for a professional level of presentation". This does not detract from the content, though a slightly higher

ASSESSMENT

Student comments

final report approached the two students seemed to be more definite in their knowledge of the assessment procedure. C_{s2} said of the viva, "My supervisor will be there, my assessor and a chairman. His function is to bend the weighting so they (the projects) are all marked to the same standard". However, C_{s1}, was a bit more explicit about it, "The viva effectively carried half the project marks". The students had also been told that the project marks were split into three. One third each for the supervisor, assessor and chairman.

mark would have been gained had the reports been more finished off.

Their performances in their vivas were as C_t had expected with C_{s1} having to be drawn out and C_{s2} saying what he wanted to say despite what he was asked. In fact C_{s2} came out a little better than his partner though both their project marks were well above average.

Both C_{s1} and C_{s2} were awarded 2 (ii) degrees. C_{s2} just making the grade due to his very good performance on the project, without which he would definitly have got a 3rd.

HAS ANYTHING BEEN GAINED?

A great deal of this project involved subject matter not covered in detail in the course and which happened to be an area of interest of both C_{s1} and C_{s2}. In this way they gained knowledge which they and their supervisor considered to be of potential use to them in their future careers. C_{s1} also said having done this project and ones in previous years gave him some degree of confidence for tackling anything that he may be faced with on taking up employment. To C_{s2} the main outcome of the project was a step up in degree class, which was something he had not considered possible.

OVERALL IMPRESSION

C_{s1} and C_{s2} obviously chose their supervisor and project topic with a great deal of care, which, in the end, paid off well. Although they claimed to be a-typical students, their approach to their project was very realistic. They were obviously very enthusiastic about the work, but were sensible enough not to let it detract from other studies. Saying that they did not take it too seriously is not as flippant as it might at first seem - perhaps what they meant was that they would let neither the project nor the course as a whole dominate their lives - no mean achievement in the final year of a degree course.

C_t seems to have been an ideal supervisor for C_{s1} and C_{s2}, though as he says so much depends on the individual students. Much more was achieved on this project than C_t had hoped for. This probably being attributable to the rapport between C_t and the two students. It would have probably been to the advantage of C_{s1} and C_{s2} if their assessor had made himself more familiar with their work before the viva, as C_{s1} particularly said he dealt only with the superficial aspects and C_{s1} felt he could have done much better had the questioning been more searching.

CASE STUDY

D

78/79

STANDARD PROJECT DATA

Duration	1 term
Timetabled hours	154
Possible Marks Final Year	6.67%
Possible Marks Degree	5 %

INTRODUCTION

The student working on this project has encountered no real difficulties in the early years of his university career. In the project some problems did occur and in overcoming them, where possible, this student learnt quite a lot about research work generally.

For reasons of confidentiality, the student is known as D_s and the supervisor as D_t.

STUDENT TIME

In the early stages of the project D_t kept a record of the time he spent on his project, roughly 16 hours per week. When he found he was unable to continue keeping the records no pressure was put on him to do so. D_t did say that he always spent at least 15 hours per week on his project for the whole of the term. Approximately therefore D_t spent in the region of 168 hours working on his project.

D_s comments	D_t comments
In the final year in school D there is a degree of specialisation called the area of choice, projects are part of the 'area of choice'. Having selected his area of specialisation, D_t chose his project topic bearing in mind two particular considerations. The first being that the topic be original and that the supervisor was someone he felt he could work with close by. D_t was known to D_s from previous years and D_s knew he was helpful and good to work with, he was also offering an original topic for a project, thus D_s found little problem in choosing what he wanted to do.	It is very difficult to come up with new projects for undergraduates every year, but where ever possible D_t does do so. D_t also finds it difficult to offer projects of any real worth as the possible marks available are so small compared to the time and effort that must be put in that anything requiring any real depth of study would be rejected by the students as too time consuming.

PROJECT CHOICE

D_s comments	D_t comments
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D_s comments	D_t comments
D_s started well on his project. D_t gave D_s some references and went over the theory of the project with him before D_s started on the practical work. In the early stages everything went very well for D_s and good results and achievements were made relatively quickly. This early progress made D_s very enthusiastic and he started to spend a great deal of time on his project, but things did not continue quite so well. D_s did not become entirely dispirited, but balanced the time he spent on his project more evenly with other work. The enjoyment that D_s got out of doing his project in the early stages was immense, but it brought him down to earth when problems occured.	D_t was very pleased with the way D_s approached his project and said that it was a pity that the project counted for so little towards the degree. It was probable, said D_t, that D_s would have to be restrained from spending too much time on his project to the detriment of other aspects of the course. The project proceeded well, on the experimental side, in fact, too well, according to D_t. D_s encountered some problems in the later stages, which, said D_t was a very good thing, as D_s has encountered no difficulties or real challenges in the whole course so far. D_t was slightly disappointed that D_s did not fully complete what he had originally set out to do, but D_t did comment that the setbacks were probably as an important a feature of a project as getting all the right results.

D_s comments

D_s was very lucky to have virtually no problems with resources, D_t being very helpful on his score. Despite the fact that the original aim of the project was not achieved a good deal of important work was done and D_s felt that D_t was quite pleased with his progress and that he would produce a satisfactory report.

STAFF/STUDENT RELATIONSHIP

D_s comments	D_t comments
D_s had known D_t from previous years. D_t was regarded by students as being a good person to work for and easy to get on with. D_s was sure that D_t was not the sort of supervisor to stand over him all the time. This was so, but D_s found that D_t was always available if he needed some help or advice.	Apart from being rather over confident and a little impatient D_t regarded D_s as a good and competent student. D_t felt that the problems that would undoubtedly occur during the project would only be good for D_s. This proved to be the case D_s did a good project, as D_t expected, but D_t thought that it could have been better, and had it been worth more, would have been so.

ASSESSMENT

D_s comments	D_t comments
D_s was under the impression that the project could contribute up to 10% of degree marks. Later he found that it was only 5% which he considered to be totally inadequate bearing in mind the time and effort that has to be put into the project. An increase of about 10% would give the project real value and encourage people to work well at it, said D_s. As it is, he said, there is no incentive to put in more work than the minimum required to give a pass marks.	In this school the project is marked solely by the supervisor, though it is common practise to have an unofficial second opinion from staff within the group to ensure some degree of uniformity of marking. Consequently the marking is very subjective, it is virtually impossible to fail and marks are usually in the range of 40 - 70%. D_t was rather disappointed with the final report. Having seen a draft and asked D_s to modify parts of it, D_t said it was unfortuate that time did not allow D_s to make all the changes that could have been made. The main weakness was the failure of D_s to relate his work to that which others had done, and there was a distinct lack of references, D_t feels that perhaps he was to blame for that and should have given more guidance. On the practical side D_s did very well, which is

D_t comments

where he made up his marks. D_t gave 65% for the whole project which was a good mark, finally commenting that had the project contributed more towards the degree D_s might have been persuaded to write a better report.

D_t believes strongly that more emphasis should be given to the project in the final year as so much time and effort are put in for fairly small rewards. The dilemma with the project and lack of marks it can attract is that it comes within the area of choice therefore the time needed for the proper approach and presentation is not availalbe. To give the proper standing to a project, said D_t would require wholesale alteration of the course, which is not at present feasible. D_t expected D_s to be awarded at 2(i) if not a lst . In fact, D_s gained a 2(i).

HAS ANYTHING BEEN GAINED?

D_s learnt quite a lot and got quite a bit out of doing the project: for example the right approach to research work and the initiation of research techniques. It has been a good project in that it has taught D_s that writing down an equation is one thing - getting it to work in a laboratory is another.
D_t thinks it is a good thing at undergraduate level that problems should occur, otherwise the students would think research work was all too easy. This is especially true of D_s who expected everything to go right the first time round, he has learnt how to tackle such unexpected problems and setbacks in a realistic way without becoming upset.
D_t was pleased to have done the project and believes it has taught him a little about research work and the problems that can be encountered.

OVERALL IMPRESSION

D_s was a competent student, fairly sure of his own capabilities, though in some respects hasty and impatient. These two traits were somewhat tempered by the end of his project, so in that respect alone he gained from his project work. It appeared that D_t made some aspects of the project easy for D_s, perhaps too easy. D_t had arranged for most of the equipment and materials that D_s required to be available for him and was readily too hand if D_s required any help.

In many respects this help could be justified - the amount of time to be spent on the project for the small amount of marks available, most assistance in such a case would be acceptable. D_t criticises himself on certain aspects of D_t's report, but not justifiably. D_s was given a good start on references by D_t and it was surely up to him to follow them through - otherwise the project would be just another, albeit extended, practical.

CASE STUDY

E

79/80

INTRODUCTION

The project studied here involves a student, E_s, who wished, and was able, to do a project on work similar to that encountered on placement. This particular case highlights some of the frustrations that can appear when this is attempted. Unfortunately E_s became very ill in the Spring term, thus she was unable to fully complete the project, but was able to submit a report.

STANDARD PROJECT DATA

Project Duration	...	...	...	2 terms
Timetabled hours	...	...	...	308
Possible Marks Final Year	...	...	...	20%
Possible Marks Degree	...	...	...	20%

TIME SPENT BY STUDENT

W/Ending	Reading	Writing	Exptl.	Talking to Sup.	Talking to Students	Totals
22/10	1.5	1	5	1		8.5
29/10		2.5	14.5			17.0
6/11			15			15
13/11		5.5	12.5	.5		18.5
20/11			4			4
27/11			13			13
4/12		4	8			12
11/12		3	.5			3.5
18/12				1		1
8/1		2	10.	.5		12.5
15/1		1	14	.5		15.5
29/1			11			11
5/2			10	.5		10.5
12/2			2.5			2.5
19/2			2.5			2.5
26/2			21			21
5/3		7.5	27.5			35
12/3			18			18
19/3		21			1	22
26/3		31		.5	1	32.5
29/4		8.5				8.5
from 30/4 to 8/5		21				21
	1.5	108	189	4.5	2	305

PROJECT CHOICE

E_s comments	E_t comments
Students are given a list of topics and supervisors from which to choose their project. The topic chosen by E_s was a fairly direct follow on to the work she had done on placement and was indirectly suggested by E_t who has a particular interest in that field. In effect E_s asked E_t to modify one of his project proposals to suit the experience that E_t had just gained on placement. E_s also thought that E_t would be a good supervisor to work for, having got to know him in previous years.	Project topics are usually suggested by members of staff, the students choosing which to do after appropriate discussions. In some cases students with particular interests or expertise can suggest their own topics and, providing a member of staff is willing to supervise it and the cost level is acceptable, then the project can go ahead. E_t selects project topics on the basis that they will not take up too much of E_t's time and they are to a certain extent self limiting. In the case of E_s, the topic finally settled on was a modification of one originally suggested by E_t. The modification was suggested by E_s to fit in with experience gained on placement. E_t thought that because of such recent experience in techniques and experimental method that E_s expected to get

E_t comments

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results quite easily.

E_t said the idea of a project was to get the students to work on their own under constraints which they may encounter once they begin a full time job.

E_s comments	E_t comments
The experimental work did not get off to a good start because of difficulty in obtaining equipment. E_s commented: "We've been spoilt. On placement anything we required was ordered and provided in a few days". These difficulties led to a sense of frustration though not disillusionment. By chance E_s heard of a piece of equipment available in the department which would greatly improve her experimental procedure, which had been fairly crude compared to that used on placement. E_s commented that it was incredible that no one seemed to have known of the existance of the piece of apparatus other than the member of staff who had told her about it: "It teaches you not to expect	Despite early set-backs E_t was pleased with the way in which E_s had tackled the problems that had arisen. E_t commented: "E_s is doing well - the project isn't". E_t had expected E_s to be able to act more independently. In most cases the ideas and suggestions that E_s made were logical and good, but E_t is of the opinion that E_s needed re-assurance as little effort was made to initiate anything new without first getting agreement from E_t. There is no doubt in E_t's mind that E_s worked as well as possible, with plenty of enthusiasm and effort put into the project. E_t does not think that E_s's illness had too detremental an effect on the project.

E_s comments

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too much of the system."
E_s encountered more problems
in the form of shortage of
standard laboratory reagents
and one of the specialised
solutions going 'off'.
Once these hold ups were
overcome E_s started getting
results - only some of them
were rather odd and could
not be reproduced. Therefore
each stage of the experimental
proceudre had to be investigated
to determine the reason for the
discrepancies. This took some
time as it was only possible to
use the laboratories when the
project was timetabled.
All these problems were finally
sorted out once results were
coming in when E_s contracted a
serious illness. The unfortunate
occurance put an end to any
further experimental work, but
E_s did recover sufficiently to
submit a project report.

STAFF/STUDENT RELATIONSHIP

E_s comments	E_t comments
E_s knew E_t from previous years and considered that he would be a good supervisor. Early set backs with materials and equipment made E_s avoid E_t for a few weeks, though the delays were not necessarily of her own making. E_s expressed the opinion on more than one occasion that if she were to get results quickly, E_t may press her to carry the investigation further. As it happened, this would not have been possible. It would appear that E_s was a little nervous of E_t and was at pains not to appear foolish in front of him, though E_s always said that she got on well with E_t.	E_t knew E_s quite well from previous years, and expected her to do a good project. He was surprised that she seemed hesitant about making decisions, as he thought she was of a more forceful character. E_s tends to work alone only going to E_t when there was a problem, this was much to E_t's way of thinking about projects. The way that E_s approached her project pleased E_t, the effort that went into it was substantial, but E_t would have liked E_s to have initiated more of the investigation.

ASSESSMENT

E_s comments	E_t comments
E_s knew that her project was assessed by her supervisor and the report by one other member of staff. She was also aware of approximately how much it was worth towards her final degree. If the project had not been assessed E_s thinks she would have enjoyed doing it more.	E_t marks the project on an approximate 50/50 split between the work done and the final report. The proportion is kept fairly flexible. The report then goes to another member of staff to be marked, hopefully with a measure of agreement with the supervisor. A moderation meeting of all project supervisors is held, all of whom have marked at least one other project report, straight swops are not done. An attempt is then made to bring all the marks into line. Although there is no set marking scheme for the school the system used seems to work well because of the relatively small numbers involved. Regarding E_s's project in particular, E_t said she had done quite well considering her illness. E_t did not see a draft copy of the report before it was typed - which put E_s out of line with others in the School - but even so the report

ASSESSMENT

E_t comments

was well put together and presented. It was obvious from the report that E_t knew what she was doing and also what she was trying to do. E_t gave a mark of about 70%. The second marker only gave about 60%, but this particular second marker is known for hard marking. Agreement was made at about 65%.

E_s was awarded a 2(ii).

HAS ANYTHING BEEN GAINED?

E_s thought it was difficult to define any specific gains from the project, but said that she was now more tolerant of the hold-ups which invariably occur in university project work. She emphasised again the difference between placement and university experience.

In this school there was such a small group of final year students it was possible to have an interest in what everyone was doing in their project and a great comaraderie built up, says E_s. Though once the projects and exams were over it just vanished. Despite the limitations of resources E_s was of the opinion that most of the final year students enjoy doing a project, she certainly did, however, many problems occured to momentarily upset and frustrate her. Overall E_s saw the project as not a bad thing, but thought that "something else" could be used as effectively to do the "same thing". Unfortunately E_s was not forthcoming on the definitions of 'something else' and "same thing".

OVERALL IMPRESSION

E_s knew exactly what she wanted in the way of results from her project having done some very similar work on placement. In some respects this was to her disadvantage as on placement there were few, if any, problems with resources which contrasted greatly with doing a University project. In talking to E_s the impression was given that she was in total control and making all the decisions about her project, just keeping her supervisor, E_t, informed of development and progress. Conversley, E_t said that he was surprised that E_s was not more forceful as she seemed to refer to him on all decisions, invariably, said E_t, he agreed with what E_s wanted to do, but would have liked her to have been more positive at times.

E_s and E_t seemed to have a fairly good relationship, though it seemed E_s was a little in awe of E_t and worried about seeming foolish in front of him. Why this should be could not be ascertained as E_s frequently said that E_t was a good supervisor to work for and easy to get on with. E_s obviously enjoyed talking about her project and said that having an interested observer, totally unconnected with her department, willing to listen to the ins and outs of her project sometimes helped her to organise her thoughts about it.

E_t had high expectations of E_s which did not reach fruition. This was unfortunate but can be explained by the unfortunate illness that struck E_s in the Spring term. The nature of it was such that she was quite severly affected for some weeks without realising,how ill she was. Naturally this was reflected on her project though as E_t said, the write up of what E_s had done was good, and though

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the hoped for publication did not materialise E_s's project, formed a good basis for new work to be carried on by someone else.

CASE STUDY

F

78/79

INTRODUCTION

In this project the student, F_s1 tried to convey an air of confidence that did not quite work. She was undoubtedly competant, but needed reassurance from her supervisor, F_t, more than usual. Despite this she did a good project, but the report was somewhat disappointing.

STANDARD PROJECT DATA

Project Duration	..	..	..	2 terms
Timetabled hours	..	..	..	308
Possible Marks Final Year	..	..	..	31%
Possible Marks Degree	..	..	..	20%

BREAKDOWN OF TIME SPENT BY STUDENT

Week ending	Experimental	Writing	Reading	Supervisor	Totals
1/12	24	3	2	0.5	29.5
8/12	21	7		1	29
15/12	10	6	6		22
12/1	3		7	1	11
19/1	32	8	3	1	44
26/1	21	1.5			22.5
2/2	21.5	5			26.5
9/2	16	10	3		29
16/2	24	2.5	5		31.5
23/2	24	5.5			29.5
2/3	21	10	4	2	37
9/3	13	22	9		44
16/3	13	9			22
23/3	18	17			35
	261.5	106.5	39	5.5	412.5

Supervisor contact greater than that indicated - casual encounter.

PROJECT CHOICE

Ft_2 comments

When setting up a project Ft_2 says "...you should know about 50% of what is going to happen and the rest is experiment and development."

He thinks it is important from a pyschological point of view that the student should get some results that can be reported. So the aim is to suggest a project that will give some results but that can be expanded by the student to show their capabilities, bearing in mind the restraints of money, space and equipment availability.

The students are meant to choose their projects before going on placement in the third year, the idea being that they do some preliminary reading before the final year starts, but this rarely occurs.

Fs_2 comments

The original idea for this project came from Ft_2 but was modified in the light of the experience Fs_2 had had on placement. This made the project very similar to the work work Fs_2 had done but was in no way a repeat of the same experiments Fs_2 says, "I altered the project to fit me."

Fs_2 also commented that she was pleased to work with Ft_2 as she did not feel that he would try to dominate and direct the project, rather she would be free to develop it herself which to her is an important consideration.

DEVELOPMENT AND PROGRESS OF PROJECT

Fs_2 comments

The preparatory phase of this project was substantially covered by Fs_2 on placement where she did similar work. It was also on placement that she found out about previous work that had been carried out which was most useful. The method Fs_2 used was a modified version of the procedure she had previously used and she received some useful help from the technical staff in setting up the process and getting it to work satisfactorily. There were a few problems with equipment in the early stages but Fs_2 thinks she was luckier than most in her department in that she was getting results only a few weeks after the start of term. Fs_2 has found that as the project has progressed the original aims of the project have been changed as unexpected and interesting facts have been discovered. In some ways the project expanded to cover new

Ft_2 comments

Although there have been a few problems Fs_2 does know what she wants to do and has developed some very interesting aspects of the methodology, in a way that Ft_2 had not thought of, which are producing equally interesting results. Generally Ft_2 is satisfied with the way in which Fs_2 is carrying out the project.

Fs_2 comments

aspects, which were followed up in depth, to an extent that Fs_2 had not thought possible. Fs_2 made her own decisions on how and what to follow up and found that Ft_2 was happy for her to do it.

Towards the end of the experimental part of the project all experiments were brought to a sudden halt as the specimens Fs_2 was using all died one weekend. In many respects Fs_2 was disappointed as there were more aspects of the investigation she would have liked to have covered, but there was insufficient time to set up another group of specimens and controls before the project report had to be completed.

Once the projects are well under way each student in dept F gives a short seminar on their own project. Fs found it most useful to do this.

Fs_2 comments

It helped her gather her ideas together and also provoked questions and suggestions that were most helpful.

STAFF/STUDENT RELATIONSHIP

Fs_2 comments	Ft_2 comments
Fs_2 is left very much to her own devices with her project work and has to go looking for Ft_2 if she has any problems. It was said by Fs_2 that it would be nice if Ft_2 occasionally asked how she was progressing. Once the results started coming in Fs_2 was quite happy to be left alone, occasionally seeing Ft_2 to keep him in the picture. Although the experimental work came to a sudden halt Fs_2 was quite happy with the work she had done, but she would really have liked to have done more. It would also have been interesting to know what Ft_2 feels about the work she has done, says Fs_2, she thinks he is quite satisfied but as she says "... he's difficult to read..."	Although fairly sure about what she wants to do Ft_2 finds Fs_2 more demanding than other project students he has dealt with because she does not seem to be too confident about working on her own. Fs_2 seems to need a lot of advice about little things where Ft_2 thinks she could have/should have made the decisions herself. She is also rather tempremental and inclined to be tearful and easily upset, Ft_2 says he was aware of Fs_2 proclivity in this direction before she started the project.

F_s comments

Some problems regarding equipment were encountered in the early stages but Fs_2 was lucky in that all the necessary equipment was obtained, the experimental work started off well and she was able to get results at a relatively early stage. Although a few minor problems occurred with aids to results analysis breaking down fairly frequently, nothing occurred to seriously hold up the experimental work, until, over a weekend, all the specimens in the test and control groups died. Since it would take a fair length of time to obtain new specimens and set up the appropriate conditions and the amount of results obtained was fairly good, it was decided to stop at that point. It is thought that the specimens died from over-heating - a very hot weekend in the middle of a fairly

F_s comments
cool spell of weather cannot easily be compensated by normal environmental controls.

ASSESSMENT

Ft_2 comments

Assessment in the final year counts for 75% of the total degree mark and is split into 4 formal examinations and the project each having an equal share of the marks, 15%.
The project is marked by the supervisor and an internal assessor. Ft_2 has his own marking scheme as follows:

Planning Work (inc. lit.survey)	.. 10%
Design & apptitude for Exptl. work	.. 40%
Interpretation & analysis of data	15%
Discussion	25%
The final product	10%

It is understood that a school marking scheme has been proposed but as yet is not in general use. Ft_2 also said that at present the supervisor and internal assessor mark the project on a 50/50 basis, but Ft_2 thinks that this ratio should be changed so that the supervisor has a greater proportion of the marks to give

Fs_2 comments

Initially Fs_2 did not know anything about how her project would be assessed, or by whom, but said she had every intention of asking Ft_2 about it even before it was mentioned in the course of this investigation.
The project is worth about 20% according to Fs_2 and she thinks this is about right considering the amount of work that will have to be put in.
At a later stage Fs_2 said she now knew the procedure and was quite happy about it.

Ft_2 comments

for three main reasons,
(i) he knows the student
better (ii) he knows how
much help the student has re-
quired and (iii) he knows
what initiative the student
has shown.
If there is a marked discrep-
ancy between the marks given
by the two assessors they have
a discussion to resolve the
differences, usually quite
easily. The problem for the
Internal Assessor is that they
can work only from the final
report and have no idea how
much the supervisor has assisted.
The final report then goes to the
external examiner and after the
examinations each student has a
viva, usually, though not always
based on the project report.

ASSESSMENT

Ft_2 comments

The report was well presented and organised and some good initiative was shown during the project, however, the writing up was appalling and to some extent incomprehensible. A lot of corrections and a number of re-writes were required. This highlighted a distinct lack of experience in communication which to some extent Ft_2 cannot understand, since a great deal of written work is done during the course, but on the other hand, he wonders if he is at fault for not explaining fully what was required. A puzzling point that Ft_2 found was the lack of positive statement where proof had been found. Despite the bad write-up Ft_2 gave a good mark (65%) as a lot of good and conscientious work had been done and good results obtained and a fair analysis was given. The part of the report on which Fs_2 really fell

Ft_2 comments

down was the discussion. Ft_2 thought that Fs_2 had not really understood all that she had read sufficiently to comment well on it. Overall the result of the project assessment was as Ft_2 had expected, he thinks that Fs_2 enjoyed the work and hopefully she has learnt a great deal from it as well as becoming quite an expert in the subject she studied.

2nd ASSESSOR COMMENTS

Ft_2 comments

The second assessor gave what she considered a generous mark of 62%. 2nd Assessor said the planning of the project was poor - supervisor to blame and the control was a single specimen, rather than a group, which could have been non-standard. The wording and general style of the report was clumsy and confusing and there were a number of self contradictions, however the presentation was very good indeed.

HAS ANYTHING BEEN GAINED?

Ft_2 comments	Fs_2 comments
Ft_2 hopes that Fs_2 has learnt a lot about report writing, certainly her presentation was good and she is quite an expert in her field of investigation.	According to Fs_2 the main point of an undergraduate course is to be taught and to learn therefore a project would have little value in earlier years. However, in the final year with, hopefully, good placement experience, the project is a good thing to tackle. It will be of help when looking and applying for jobs especially in the research area. The fact that this investigation was being made did make Fs_2 look more closely at the whys and wherefores of her project, but, she says, has not affected it in any other way.

OVERALL IMPRESSION

Ft_2 seemed pleased that Fs_2 had chosen to do this particular project, even though it was slightly altered from his original idea, I believe it is in some way connected with his personal line of research. As far as Fs_2 was concerned the supervisor was nearly as important as the subject when it came to project choice, though the fact she had been doing very similar work on placement influenced her a great deal.

Talking to Fs_2 during the project it was obvious that she knew what she wanted to do and gave or rather tried, to give the impression that she was perfectly in control and competent to do what was necessary and take all the appropriate decisions as and when required. This idea is somewhat at variance with the view from Ft_2 who implied that she needed frequent reassurance and back up. The true situation is probably indefinable.

It would seem that this project was the first really important work that Fs_2 had carried out alone and therefore it is not surprising that she should want to impress an outsider, but at the same time have all her decisions backed up by her supervisor 'just in case.'

Fs_2 was fairly lucky in many ways, she did not have great problems with her materials and equipment, there were a few hitches when the machines she used for analysis kept breaking down, but nothing that was not fairly easily overcome. The greatest disaster came fairly late on when all the specimens died, but fortunately since the investigation had gone so well in early stages enough results had been obtained on which to base the report.

The report itself was very well presented, but it is true to say that the comments made by the supervisor and second marker regarding

the content of the written sections were by no means unjustified. This fault in the communication side could well be a fault in the course as a whole rather from purely the responsibility of the supervisor. One comment about planning that was made by the second marker was only partially justified. It is surely in the nature of original research that new avenues open up as the work proceeds and these are frequently worthy of investigation. Since the report was not well written this point may not have come over clearly. In fairness it must be said that the second marker did give a fairly good mark for the project which turned out to be fairly crucial. It turned out that Fs_2 was on the borderline between a 2(i) and a 2(ii) and it is the project that turned the decision in her favour, according to Fs_2. It was also noticable that Fs_2's self confidence had increased tremendously having received her results, she seemed to be the person she had tried to be earlier in the year.

CASE STUDY

G

78/79

INTRODUCTION

G_s was a fairly quiet student who made no great effort to assert herself in the course of the project, despite having her own definite ideas on how it should be run. It was unfortunate that G_t had a very forceful personality with which G_s felt unable to compete. It could be that G_s was afraid of G_t, leading to her not doing as well in her project as she could have done.

STANDARD PROJECT DATA

Project Duration	..	..	..	2 terms
Timetabled hours	..	..	..	308
Possible Marks Final Year	..	..	..	31%
Possible Marks Degree	..	..	..	20%

PROJECT CHOICE

Gs comments	Gt comments
It seems to Gs that very little original thought goes into the production of project topics by numbers of staff, most, if not all, seem to be the continuation of earlier projects or slight modification thereof, and in the majority of cases are an aspect of the research work being carried out by individual staff members. Having been given a list of titles at the end of the 3rd year decisions about possible topics are meant to be made about which projects are of interest before returning here for a weekend conference mid way through placement. During that weekend discussions take place between staff and students and a final choice is made. Gs made a short list of her interests and first went to see Gt and	In this field it is not easy to come up with completely new projects every year so projects tend to follow on in some respect from the previous years' work though not necessarily directly. Gt thinks Gs is quite a good worker though rather quiet and will probably do a good project.

Gs comments

found herself organised into doing it straightaway without having the chance to discuss other options with other members of staff. To some extent Gs felt rather bulldozed, but she was not unhappy about the project though she did have reservations about Gt.

Gs comments

Despite being told that major items of equipment would be made ready for the beginning of the University year. Gs spent the better part of two months sorting out her needs. This was not a very good start to the project. However once the problems of equipment were sorted out the experimental work went ahead fairly satisfactorily. There was little in the way of technique development for Gs to do as this had already been refined in a project last year the report of which was given to Gs. Gs feels that as this project is a continuation she is doing more of what Gt wants her to do rather than that which she would like to do herself. Useful this may be in terms of marks but not in satisfaction and experience.

Gs comments	Gt comments
When left alone to get on with her work Gs is quite happy but this is not always possible, occasionally Gt is overhelpful and tends to take over the experimenation. Despite this interference Gs has a good number of results and hopes to produce a fair report. (Difficulties were encountered when it came to interpretation of results which resulted in Gs virtually going into hiding and it was impossible to contact her physically again).	The approach and attitude towards project work taken by Gs greatly pleased Gt, the most common adjectives being used when describing her work being meticulous and accurate. Gt was also pleased with the original ideas and developments Gs initiated whilst Gt was away even though it was a slight deviation from the original format of the project as Gt envisaged it. The disappointment came in the treatment of the data obtained. Gt said that had it been seen earlier perhaps they both could have done something about it whereas it was really too late to do anything when it was produced.

G_s comments

Within the year group when G_s and many other students had to struggle to get their projects started others arrived back to find everything set up for them and all special items easily to hand. This says G_s is a bit unfair. When the project choice was made the students were told that early decisions were necessary so that special items of equipment and materials could be obtained in good time. In some cases this did happen but in the majority the reverse was true. G_s therefore, had to spend a great deal of time finding fairly basic items and ordering the materials required. This wasted nearly two months, and though she was not idle in this time it could well have been better spent. Another point made by G_s was that little help was forth-coming from G_t who did not

G_s comments	G_t comments
really appear interested in the project until results started coming in. It is true to say that the technical staff are somewhat depleted in this dept. and there is only really one person who knows what is available and where, but it does make life even more difficult for final year students when they encounter these sort of set backs.	The only comment made by G_t on the subject of resources was that they are strained and the best has to be made with what is available.

ASSESSMENT

Gs comments	Gt comments
Gs believes that the project is 'worth' about 20%, however, the amount of work that has to be put in to get a good mark is, she says out of all proportion to those marks available. There exists a degree of discontent amongst Gs's colleagues due to the amount of extra work that has been given to them which encroaches on the timetabled project work.	Gt uses a marking scheme, but it is not used throughout the department, it is by no means rigid as the emphasis in each project is usually different. Another member of staff unconnected with the project also marks the report, after which a meeting with the supervisor is held to decide on the final mark. Gt expects 2nd assessor to notice things that supervisor misses. At present supervisor & 2nd assessor carry equal weight - this soon to be changed to 60% supervisor 40% assessor. The students are aware of how many marks are available on the project but do not know who, other than the supervisor, will mark it. In an effort to curtail the time spent by students, over and above the allocated time, on their projects extra work, in the form of essays has been given to them. Gs is not sure this was

Gt comments

the right thing to do, but was necessary as some of the students seem to spend far too much time on their projects.

Gs was surprisingly late in writing up and submitting the rough draft of her report, consequently Gt was not able to go through it really thoroughly to help make it a better report. This out of character behaviour on the part of Gs could probably be explained by her discovery that a number of negative results, which were obtained during the course of her laboratory work, were statistically significant. Up to that point Gt believes Gs had ignored these negative results but says that it was not a point that had been discussed by them, as even a possibility, at any stage. The discovery that could be significant probably threw G_s off balance and thus made the forward planning phase of her report a minor disaster.

ASSESSMENT

Gt comments

Thus when it came to marking the report Gt found that the discussion and interpretation were very weak but in the 'carrying out' part of the project there was very little with which to fault Gs, except that she left the working out of her statistics too late for any really useful discussion to take place before she had to write up. Excluding the discussion the rest of the report was reasonable. Gt gave Gs a mark of 67 and the other assessor gave her just over 60 which will give a reasonable average. There is no doubt that Gs would have done considerably better had she not gone to pieces over the interpretation of her results.

OVERALL IMPRESSION

There is no doubt that Gt has a very dominant and forceful personality and equally it is true to say that Gs, a quiet and unassuming student, was inhibited in many ways because of this. Gt was aware of Gs's character and was surprised and delighted when, once the project really got going, how well Gs worked - though it is not obvious to me why a quiet person should not work just as well as a more flamboyant character. Gs had quite a deal of difficulty in setting up her project in which she received little or no assistance from Gt, which, I believe, she somewhat resented. Unlike most of her colleagues Gs did not have the opportunity to do any project or research work whilst on placement so she was at a disadvantage anyway. Therefore when at last the experimental work was set up and she began to get results Gs found it rather annoying that Gt was interested and, indeed, even helpful. It must be said that when the project was first discussed and areas of interest defined the possibility of sigificant negative results was never mentioned and considering the total inexperience of Gs it is perhaps reasonable to criticise Gt on this score. Gs is not without blame either, it is possible that she did not discuss with Gt aspects of her work as often as she should have because she felt as if Gt wanted to take the project over rather than let her develop it in her own way.

CASE STUDY

H

78/79

INTRODUCTION

The pair of students carrying out this project seemed to complement each other well. H_s1 being more of a thinker and H_s2 a doer, though both made significant contributions in both areas to the project as a whole.

PROJECT CHOICE

Hs_1 and Hs_2 comments	H_t comments
These students have worked together in earlier years and found no great problem in choosing a topic. Three subjects were seriously considered, the final decision being made after supervisors degree of speculation and future usefulness had all been taken into account. A number of other project topics were not really considered because of the supervisor.	The first few days of term are a bit of a scramble as the students find a suitable partner, topic and supervisor. H_t believes the students choose a supervisor with whom they think they will get on well and in practice, this usually works out to be correct. The project titles are usually fairly general and it is only by discussing it with the supervisor involved that the real problem involved can emerge. Quite often the projects are based on a real industrial problem using data supplied by an industrial organisation.

Hs_1 and Hs_2 comment	H_t comments
Initially Hs_1 and Hs_2 felt as if there was little for them to do as they could find little published information in their area of investigation, additionally they were unable to use their rig for the first few weeks of term. The difference between tackling a project of this nature and their previous lab work was extreme having been "nursed" through practicals in earlier years. Since they are now in a position where they must make their own decisions regarding experimental procedure etc., their first thoughts of the project being fairly straightforward changed dramatically. "...Things are beginning to ....sort of....expand expotentially ...its more difficult than we originally perceived". Having worked out the method-ology of the investigation	H_t is quite satisfied with the way Hs_1 and Hs_2 are tackling their project. Initially they got together to discuss the project as a whole and the method of approach, H_t also gave Hs_1 and Hs_2 some papers to start them off. As H_t expected things went fairly slowly at first but as the students got more into the project, so the tempo increased. H_t says he thinks the students were somewhat surprised to find that there was more to get out of the project and more to interest them than they had originally thought possible. This pair have worked extremely hard and have produced too many results in a way, according to H_t, which could well make it difficult to produce a thorough write-up.

Hs_1 and Hs_2 comment

mainly on their own but with some help and advice from C_t they made out an instrumentation list for the chief technician, though as Hs_2 said,"It's very difficult to know what we will require and in any use our needs will change as we go along". The actual experimental time spent was not great, the main obstacle to be overcome was to get all the instrumentation, some of which had to be adapted by Hs_1 and Hs_2, to function at the same time. At length this was achieved and the results required were obtained in a rush over a weekend as the rig was required for other uses. Hs_1 and Hs_2 then had the task of determining, from their results, why the theory and practise of their investigation did not agree. They then presented their

Hs_1 and Hs_2 comment

results and conclusions in the form of a seminar prior to handing in the final report. They had given a shorter seminar at a very early stage which they found quite useful.

Hs_1 and Hs_2 comment	H_t comments
Both Hs_1 and Hs_2 knew H_t from previous years and thought that they could work well with him. As the project has progressed they have seen H_t fairly regulary, either in his office or, at a later stage, in the workshop. Hs_1 and Hs_2 found H_t helpful especially in the early stages on the definition of the project which Hs_2 says was done better than most. They also thought that H_t would have interferred had he thought they were going very wrong. It was implied that H_t was very particular about aspects of the project, though more in the way it was finally written-up rather than the "carrying out" procedure. As well as seeing their supervisor Hs_1 and Hs_2 also saw their Assessor, someone	H_t suggests that often especially in a project which originates from industry the supervisor can become immensed in the problem and really becomes a member of the investigating team. This does vary considerably from one member of staff to another. H_t prefers to be slightly more aloof and let the students come up with ideas and suggestions, getting on with the project in their own way whilst H_t is still in a position to discourage totally irrelevent and wasteful work. H_t knows Hs_1 and Hs_2 quite well and envisaged no problems in working with them. It has turned out that he was so pleased with their work and the way in which one of them worked that he wanted one of the students to stay on for a research post.

Hs_1 and Hs_2 comment

else that they knew quite well. He visited the test rig twice and, especially on his first visit, when he asked some awkward questions which really got them thinking, Hs_1 and Hs_2 felt these visits were a helpful and useful aspect of the Assessors function.

It was felt, overall, by Hs_1 and Hs_2 that their supervisor was about right. They were pleased that H_t did not try to impose his ideas for solving the problems on to them, and that they could say quite happily that the project represented their ideas and solutions.

Hs_1 and Hs_2 comment

Within the first few weeks of the project the students have to submit a written list of their requirements to the chief technician. This is a good idea in itself, however, as Hs_2 says more often than not needs and requirements change as more is learnt of the project and unless a good relationship exists with the technicians it can be difficult to obtain special items. Luckily, Hs_1 and Hs_2 have had no problems in this area, the greatest difficulty has been the availability of the test rig which is often used for demonstration purposes. For this reason they found themselves working over weekends, but as they said that has advantages too.

ASSESSMENT

Hs_1 and Hs_2 comment	H_t comments (general)
The students are fully aware of how the project is marked and how much it is"worth" towards their final degree. They do not know who the assessor will be until after the project has began.	The way in which a supervisor has to interfere or not is one of the ways H_t thinks students can be marked on their project, another area is initiative and general approach to the problem. Depending on the project a supervisor should decide how the marks will be divided between the different sections and mark accordingly. The assessment of the project takes place almost continuously throughout the allotted time and only a relatively small amount of marks are available for the final report. A special form is used, of which the students are aware, to build up a "grading assessment profile". After submission of the final report which is read by the supervisor and assessor a mark is given and the report passed to a senior member of staff unassociated with the project. The final mark is then agreed upon.

ASSESSMENT

H_t comments
(Specific)

Because of the marking scheme used assessment has been taking place throughout the project. As for the final report, H_t saw a draft copy some sections of which he considered to be too long and subsequently advised Hs_1 and Hs_2 to cut some areas, but left the final revision to them. H_t did not think the students had time to do a proper revision reduction but it turned out fairly well in the end. The marks allocated to the final report are not great as most of the assessment has already taken place by the time it is received, in fact, there are more marks for the draft copy than the final report. Other marks are allocated to the weekly log book and the way in which the project was carried out.

HAS ANYTHING BEEN GAINED?

Hs_1 and Hs_2 comment	H_t comments
The idea of a project appealed to Hs_1 and Hs_2 as a change from the lab work they did in earlier years where everything was laid on for them and all that was necessary for them to do was to follow the instructions on the lab. sheet. They found there was no need to question what they were doing or why, though the idea of the labs. was to relate previously learnt theory to actual results obtained in practise. To some extent they both thought these results were "fixed". The project, then, appeared as someting rather different, as a mind bending exercise in the how's and why's of iniating and carrying out an investigation. Hs_1 and Hs_2 intended spacing out their project work as much as possible to avoid a last minute panic, but inevitably,	H_t says that as the project progressed the interest of his students grew. Their eyes were opened to the difficulties of R and D work, the lack of understanding of the behaviour of quite common components and the way in which results fail to fit preconceived concepts. This has enabled them to become more flexible in their approach to this type of work which should be of considerable use to them in later years.

Hs_1 and Hs_2 comment

this did not work out. They were pleased with the way their project went in that they found positive practical proof that some of the assumptions made in the theory they were testing were wrong and they were able to suggest modifications. So although the work they have done is of no direct use to them once they start work in industry it has relevance in that they did a useful investigation virtually on their own which provided a good degree of satisfaction.

OVERALL IMPRESSION

This was the only project studied that involved two students working as a team. It was obvious from my first meeting with them that Hs_1 was the leader, initiative and ideas man, whereas Hs_2 seemed content to follow on though occasionally making an original contribution. They had often collaborated in earlier years and seemed to have a good working relationship. In the early stages of their project they seemed to flounder a little, but eventually found their feet and discovered there was more to their project than they had anticipated. This discovery seemed to please them and their enthusiasm was encouraged by their supervisor who seemed to give them just the sort of advice etc., that they needed.

Many lessons were learnt, for example how difficult it can be to regulate the timing of research work, that in real life things rarely work out exactly as expected and that text books are not always right.

The assessment procedure, though rather bureaucratic seem to work well to the satisfaction of both staff and students. One criticism is that perhaps the library could be used more and perhaps its use encouraged in earlier years as this would enable the students to get a better start on their projects if they were more familiar with the literature available.

CASE STUDY

J

79/80

INTRODUCTION

J_s was a very able student who had particular interests in the field in which he was studying. He arranged how own project topic with a member of staff, J_t who shared these interests, but who was from another school in the university. This was done with the full agreement of his own school.

STANDARD PROJECT DATA

Duration of Project	...	...	...	2 terms
Timetabled hours	...	...	...	308
Possible Marks Final Year	...	...	...	31 %
Possible Marks Degree	...	...	...	20 %

STUDENT TIME

J_S estimated that he spent about half the working week on his project. He would have liked to spend more time on it, but felt that other work had to have some priority in the final year.

PROJECT CHOICE

J_s comments	J_t comments
J_s has known J_t for a number of years and shares many interests in the field in which he is studying with J_t. Consequently when J_s was working in his last placement in the third year he began to look in the literature for various possible project topics. These he discussed with J_t, finally deciding upon one in which they both thought good progress could be made in the time available. These decisions were made well in advance of the project choices being given to J_s's colleagues by the staff of school J. J_s did look at the list of project topics provided but did not seriously consider any of them. In the topic he chose J_s had to learn new techniques, which he considered	J_t was pleased to supervise the project that J_s wanted to do as it was very much involved with his own research interests. It was also interesting for J_t in that he had never supervised a project in this form before and thought that it would be good experience for him.

J_S comments

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an important feature, added to which was the experience in designing and setting up experiments, though this was only reinforcement of placement experience.

DEVELOPMENT AND PROGRESS

J_s comments	J_t comments
The project got off to a good start with few problems occuring. The main point that J_s made was the difference between doing projects or placement and at university. There is no lack of equipment at university, but so many people want to use it than on placement that it is necessary to book some items in advance. J_s said that had it not been the final year he would have been tempted to spend more time on his project, as it is, he is restricting himself to putting half his time into the project, just enough to get good results and a good mark out of it.	Knowing J_s well, J_t had no qualms about the way in which J_s approached his project. In fact J_t said that he learnt a lot from it and was most stimulated by the motivation J_s showed, and J_s's depth of study in-to the literature and hence novel approach to interpreting results showed the qualities that J_t felt projects should bring out in students. The ideas and developments of methods and techniques were all initiated by J_s, again, said J_t, something that the project should bring out. Overall J_t had nothing but praise for the time and effort put in by J_s on his project.

STAFF/STUDENT RELATIONSHIP

J_s and J_t

The relationship between J_s and J_t has been very good for a number of years and can only be said to have developed through working together on this project.

ASSESSMENT

J_s comments	J_t comments
J_s was rather worried at the validity of staff giving students a topic for a project, supervising them and then assessing the end product. He was puzzled as to what the staff were looking for. In his own case, said J_s, it was different as he had suggested his own topic and he knew exactly what he wanted to do with it, but even so he's not sure what the staff will look for in his report. J_s was aware how much the project was worth and allocated his time between that and other studies accordingly.	J_t received instructions on the marking procedure to be used for the project and was also informed who the second member would be. He feels the roles of supervisor and assessor, though different should be complementary. In some ways J_t does not think projects should be marked, but the important fact is that a project tests in student things that other forms of assessment do not do. Expanding on that point J_t said that some university courses do not challenge students or get them to apply the knowledge and techniques they have learnt. But to give a student X months to solve a problem, in the form of a project will do just that. He has to make sense of the literature, formulate questions, apply techniques and perhaps develop new techniques. What a project is trying to do is to get people to think creatively, apply information and facts, construct theories etc.

ASSESSMENT

J_t comments

Many of the above points are difficult to quantify but can be seen as the project progresses and the report completed. Reading J_s's final report J_t's first impression was that it was very good, but could have been better. J_t did not feel that J_s had made full use of the data he obtained and, in J_t's opinion could have made more definite statements in his conclusions. However, said J_t, J_s erred on the right side. Specific points made by J_t on the project were (i) the literature was extensive in an area that has been little studied. J_t could only be expected to scratch the surface and he had made a commendable and successful attempt. (ii) the enthusiasm shown throughtout the project by J_s was admirable, so much so, that J_t felt compelled to curb it to achieve a balance with other parts of the course. (iii) the results were adequate, though brief in places. (iv) the discussion, the

ASSESSMENT

J_t comments

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most important part according to J_t, was competent and comprehensive. J_t said it was good to see data from other areas of the subject being applied in a new way. Overall the report and project was a good piece of work. The mark given by J_t was 68%, a good 2(i).

J_t was present at the viva that J_s had with the external examiner and said that J_s gave a really first class account of himself. If his report had been that little bit better, J_s would probably have got a 1st. He was awarded at 2(i).

HAS ANYTHING BEEN GAINED?

In deciding on his topic J_s chose to investigate a problem that involved him in learning new techniques. In that respect he got a great deal out of the project though in other ways he does not think the project is a necessary part of the course. J_s was fortunate in his placement experiences where he was mainly concerned with projects of various kinds - though not of his own choosing. Because of this J_t felt that, apart from techniques, the project taught him nothing new and that more marks should be given to placement reports rather than the emphasis on the final year project.

OVERALL IMPRESSION

This was a unique project, for although it is not uncommon for students to suggest their own project topics, to have an 'outsider' supervising it is rare indeed. When it is known that J_s and J_t have known each other for many years and have worked together in some small way, then the situation is not so strange.
J_s knew exactly what he wanted to do and he went ahead and did just that. There were no problems about how to get a research project off the ground and he was able to see J_t if and when he needed to. So in many ways this was an idealised project. Not everything went according to plan, but neither J_s nor J_t expected it to do so. It was probably this attitude on J_s's part that made this project so different from the others in this study.

CASE STUDY

K

79/80

INTRODUCTION

A pair of students were involved in this project. Their topic is a direct follow on, using the some equipment, as those students involved in Case Study B. In this case the project is the second of the two one term projects carried out by students of lesser ability range in this department.

The students are known as K_{s_1} and $K_{s}2$ and the supervisor as K_{t}.

STANDARD PROJECT DATA

Duration of Project	1 term	
Timetabled hours	77 hours / term	
Possible Marks Final Year	$\frac{16.7}{2}$ %	(1)
Possible Marks Degree	$\frac{11.5}{2}$ %	(1)

Projects in this department always carried out by pairs of students.

Two one term projects are carried out, thus total possible project marks are:

Final Year	16.7 %
Degree	11.5 %

PROJECT CHOICE

K_s1 and K_s2

The students, K_s1 and K_s2 had the list of available projects at the same time as their colleagues, but they couldn't make up their minds. In the end when they had to make a choice it was very arbitrary, they chose what seemed to them the most interesting of those topics remaining. Some topics they did not consider because of the supervisors, but they did not particularly chose K_t, they did not know him well at all, only having had a few lectures from him in earlier years.

K_s1 said that he would have preferred a project of more direct relevance to his work in industry - but that was not possible.

K_s comments	K_t comments
The rig involved in this project was very simple, straightforward and self- contained. K_s1 and K_s2 spent some time familiarising themselves with it and K_t explained its function and potential use. K_t told the students what he wanted them to investigate but not how to do it and he also gave them some references. Then as K_s2 said "....he felt us to it". Both students found the theory of their study rather confusing at first, but once they had worked out how to explain and interprete any results they might get from their rig they had no great problems at all. K_s1 said that it was more satisfying to work on a self-contained unit, in their previous project a great deal of time was wasted searching for odd bits and pieces. Once the theory was understood, it was easy for K_s1 and K_s2 to get results. K_t helped a little	K_t was pleased with the way K_s1 and K_s2 approached the project they were very careful and sensible. In some ways they benefitted from the mistakes B_s1 and B_s2 had made, but their whole attitude was different, said K_t. The students reach a stage in the project that K_t had not expected, and this pleased him greatly. It was obvious, K_t said, that they understood what they were trying to do.

K_s comments

in the interpretation, but this was mostly done by the students.

STAFF/STUDENT RELATIONSHIP

K_s comments	K_t comments
Neither K_s1 nor K_s2 really knew K_t before this project, but both agreed, towards the end, that he was a good supervisor, better than the one they had had in their previous project who was Ks_1's personal tutor. Their main comments were that K_t did not interfere with what they were doing, but he was always available for help and advice if needed.	K_t was pleased with the way K_s1 and K_s2 settled down to their project work, Tney both put in a great deal of time and effort and achieved more than K_t had expected. To a certain extent, said K_t, K_s1 and K_s2 restored his faith in the ability of students after the miserable effort put in my B_s1 and B_s2.

ASSESSMENT

K_t comments	K_s comments
K_t was very pleased with the way in which K_s1 and K_s2 did their whole project. Their report was good, though there were one or two ommissions which were quite important. The students had reached a point in the investigation that K_t had hoped for, but not expected. K_t was also delighted that K_s1 and K_s2 obviously understood what they were doing and trying to do, and why. Both K_s1 and K_s2 joined in all discussion on the project, they were both there working on the rig with obvious enthusiasm, and it seemed to K_t that both had put an equal amount of effort into the project. K_s1 and K_s2 were given a mark of 70% for their project.	Neither K_s1 nor K_s2 said that they knew much about the assessment procedure used for their project, but they did know how many marks were available for it. At the start of the academic year the students were given a hand-out giving a run down on what was expected of them and how to lay out the report. Despite this K_s1 and K_s2 said they are not sure about what is being looked for in the report. A lot, they say, seems to depend on the supervisor and the emphasis he places on various aspects of the project and the report.

HAS ANYTHING BEEN GAINED?

Apart from teaching them how to write reports. K_s1 and K_s2 do not feel they learnt alot from doing their two one-term projects. They did say that the projects formed a useful part of the course if only to relieve the monotony of lectures. Ks_1 felt that he would not have liked a 2-term project, the one-term ones are less intellectually demanding. Thus two one-term projects were just about right for both Ks_1 and Ks_2 as neither of them did very well in the examination in previous years.

OVERALL IMPRESSION

It is very difficult not to compare Ks_1 and Ks_2 with their predecessors Bs_1 and Bs_2. The difference in attitude and approach to the project were so marked as to be doubted had it not been observed first hand. From K_t's comments, it could be seen that the way in which Ks_1 and Ks_2 conducted their project, whilst not being perfect, did approach the ideal. The students were well motivated and became really interested and enthusiastic about the project. The way in which Ks_1 and Ks_2 were supervised was a factor which influenced their positive approach to the project. The project was a success both for students and staff.

CASE STUDY M

79/80

INTRODUCTION

Ms_1 and Ms_2, the two students involved in this project, have both had placement experience but have not encountered project work of this nature. They were both rather surprised about the time it took to make any progress.

Standard Project Data

Duration of Project	2 terms
Timetable hours	154
Possible Mark Final Year	16.7%
Possible Mark Degree	11.5%

Time Spent by Student

W/ending	Reading	Writing	Experimental ( )	Talking to supervisor	Talking to other students	Totals
21/10		1½	4½	½		6½
28/10			6		2	8
4/11		½	5			5½
11/11		1	2			3
18/11	2		5			7
25/11	1½		3			4½
2/12		2	5	½		7½
9/12			4	½		4½
10/12		2				2
27/1			5	½		5½
3/2	1	1	5			7
10/2			8			8
17/2		1	4			5
24/2			1	½		1½
2/3		4	3	½		7½
9/3	2½	10	8	1½		22
16/3		27½		1½	4	33
23/3		4				4
30/3		30				30
TOTALS	7	54½	68½	6	6	172

PROJECT CHOICE

Student Comments	Supervisor Comments
While on placement before the start of the final year Ms_2 was visited by a tutor who told him about some of the projects being offered and suggested that Ms_2 would like to choose one that was applicable to the course that Ms_2 was following. The tutor turned out to be the supervisor of the project that Ms_2 decided on. This same tutor also visited Ms_1 and told him of Ms_2's choice. Ms_1 then contacted Ms_2 and arranged to work with him. Ms_1 and Ms_2 work for the same company, but in different plants, and have worked together in earlier years The practise of tutors telling students on placement of projects available in the final year is unofficial, but, according to Ms_2 is fairly widespread in school. As Ms_2 said "...it saves all the fighting at the beginning of term over who's going to do what...." Both Ms_I and Ms_2	This particular topic is a direct follow on from some previous research work done on the same rig, though a different aspect was to be studied. M_t does not always find it easy to offer original topics for projects, but does so where ever possible. M_t thought that this project might suit Ms_2, bearing in mind the rest of his final year course and was pleased when Ms_2 and Ms_1 said they would like to do the topic together.

said they knew M_t quite well, and that he seemed the sort of person who would make a good supervisor. Ms_1 made the comment "You want someone that can get on with, that you know", he also said "If you don't get on with a lecturer or he's not too helpful and can't explain things anyway if you get into difficulties, it's banging your head against a brick wall".

DEVELOPEMENT PROGRESS

STUDENT COMMENTS

The experimentation started off fairly slowly. It was not as simple and straightforward to take measurements as Ms_1 and Ms_2 had anticipated. Thus they spent quite some time in devising measurement methods, much longer than they had anticipated, as Ms_1 said "When you plan to do something you don't always allow for things not going perfectly..." Both Ms_1 and Ms_2 spent some time in the library in the early stages of their project. They found a reasonable amount of general literature but very little on the specific issues with which they were involved.

Some headway was eventually made and the measurements needed were able to be recorded. Great help was given by the technicians, as Ms_1 said"...the technicians suggested all kinds of things for us to try. We wouldn't have known otherwise..."

SUPERVISOR COMMENTS

Although Ms_1 and Ms_2 were to slowly make progress in the initial stages of the project M_t was not surprised. It was because they came up against problems that they had not considered could arise. With really brilliant students, said M_t, it would not haveoccured but they are the exception rather than the rule. M_t is of the opinion that it does no harm to the students to "stub their toes" on a few problems. It was necessary for M_t to'point the students in the right direction' at times, but as M_t said ".. they are good sound lads and do a routine job well...." Overall Ms_1 and Ms_2 performed in their project as M_t had expected. Guidance was given to the students by M_t over the format of their report, but M_t found it".... rather bitty and in need of editing...." M_t said it was not

STUDENT COMMENTS

Ms_1 and Ms_2 were left to get on with their project by M_t, but he was always available if they had a problem. Ms_2 said that he found the log-book that they are required to keep very useful, it reminded them of little things they had done and tried in earlier weeks that were easily forgotten. Better progress was made with the project in the second term, as Ms_1 commented "...we concentrated at first on trivial things that we thought would pay off in the end but didnt..." Ms_2 said it was unfortunate that they did not manage to do all that was orginally intended with the project, but that their supervisor was pleased with what had been done. Their draft report was written up in good time. This was a deliberate decision by Ms_1 and Ms_2 in which they were encouraged by M_t, thus allowing themselves enough time for revision for final exams.

SUPERVISOR COMMENTS

uncommon for the draft to be rough as students often rush to get things done at the last minute, however the final report presented by Ms_1 and Ms_2, was much more as M_t liked.

STAFF STUDENT RELATIONSHIP

STUDENT COMMENTS	SUPERVISOR COMMENTS
Both Ms_1 and Ms_2 have known M_t their earliest days at University and he is Ms_2's personal tutor. At the start of their project both students felt that M_t would be a good supervisor, and as the project progressed they were pleased with the supervision they received, as Ms_1 said "...he gives us a lot of ideas to work on when we're really stuck...." and Ms_2 commented"... he makes you get on with it...." Towards the end of the project Ms_1 said that the advice that M_t had given him and Ms_2 about the way their report should be written was most helpful"...In fact" Ms_1 said"...he has been a great deal of help all through. He's left it largely up to us, but he has always here to help if needed..."	M_t felt that he knew the students, Ms_1 and Ms_2 quite well. He was personal tutor to Ms_2 and had taught Ms_1 from the first year. The students performed in their project very much in the way M_t had anticipated and he was neither disappointed nor surprised by their work. M_t made the point that both students were reliable and hardworking.

ASSESSMENT

STUDENTS COMMENTS

Neither Ms_1 nor Ms_2 were sure much worth the project was to them in terms of marks nor did they seem at all concerned. M_t did tell the students about the way in which he would allocate marks and those areas in which they would be most concentrated. They also said that they had been given printed information sheets, but neither student was sure what was said on the sheets. Ms_1 said they knew who their assesor was, but had hardly seen him.

SUPERVISORS COMMENTS

As well as a supervisor each project is allocated an assessor whose function is to observe the project without getting involved in the supervision. The assessor then reads the final report and hopefully concurs with the mark awarded by the supervisor. When all the projects have been marked a moderation meeting is held with all supervisors and assessors in order to give an overall balance to the marking.

M_t said that this had not been an easy project and it had many loose ends. He was not altogether happy with the way Ms_1 and Ms_2 started off the project but

SUPERVISORS COMMENTS

they did settle down well. M_t gave the students a project mark equivalent to an average 2.1. Both students were awarded a 2.1 degree.

HAS ANYTHING BEEN GAINED

Ms_1 said that the project was an important feature in the course even if projects were encountered on placement. This was because in a university project

> ".... you are given a chance to formulate your own ideas and go the way you want to. Whereas in industry you've not allowed to do that - you're told...."

said Ms_1. Another worthwhile point, according to Ms_2, is the experience of organising a research programme, which is useful even if it is not intended to go into research work. It is important to realise that there are other things to look for rather than just results when doing reseach, said Ms_2. Ms_1 commented

> ".... It's been a useful exercise...."

OVERALL IMPRESSION

In common with many projects this one had rather a bumpy start with the students not exactly sure where they were going and taking sometime to sort themselves out. As they had no previous experience of this sort of work it was not altogether surprising. Indeed the supervisor expected this phase to occur, but perhaps it lasted longer than was necessary. Both students and supervisor got on well and there was no ambiguity about what was required by the students. There was little disappointment on both sides that every aspect was not covered but there was a distinct feeling of satisfaction on what was achieved.

CASE STUDY

R

79/80

INTRODUCTION

The project described here involves an academically above average student whose practical ability does not quite match the potential shown in theoretical work. This resulted in a competent project, but somewhat disappointing from both student and supervisors point of view.

For reasons of confidentiality the student is known as R_s and the supervisor as R_t.

STANDARD PROJECT DATA

Project Duration	..	..	..	2 terms
Timetabled hours	..	..	..	308
Possible Marks Final Year	..	..	..	31%
Possible Marks Degree	..	..	..	20%

CASE STUDY R. Time Spent by Student

W/Ending	Reading Lit.	Writing	Exptl.	Talking to Sup.	Talking to Student	Totals
4/11	1	3½	15½	1½		21½
11/11	1	½	10½	1		13
18/1			10	½		10½
25/11		1	22½			23½
2/12		1	19			20
9/12	2½	1	13½	½		17½
16/12			16			16
13/1	5	1½	14			20½
20/1	14	3	3½			20½
27/1	10½	6	5½	1	1½	24½
3/2		1	26			27
10/2		½	12½	½		13½
17/2		2½	7½			10
24/2	1½	8½	7½	2	½	20
2/3		7½	2	1	½	11
9/3		1	3½	½		5
16/3		19½	3½	1	½	24½
23/3	1	18½		½		20
30/3		10	½	1½		12
Total for April		21		3		24
Totals	36½	107½	193	14½	3	354½

PROJECT CHOICE

R_t comments	R_s comments
Whenever possible R_t likes to offer original project topics, but also believes that trying to reproduce novel results from recent literature can provide a valid project for an undergraduate student. Obviously R_t looks for projects in his own areas of interest but they tend not to be directly related to his own field of research. R_t believes that students should be enthused by their projects and should demonstrate the capability to overcome the difficulties involved in running a short term research programme they need to show initiative in starting the project off and to develop self sufficiency and an awareness of when to ask for help and from which quarter to seek it, not necessarily	Rs chose this project because of the scant experience acquired of setting up experiments alone: "... I wanted to see if I could do experiments which may sound silly, but I haven't had much experience of setting up my own experiments....." In earlier years all the practicals were set up for the students, who just came along to a ready made experiment. R_s believed that the experiments involved in this project would be fairly straightforward, with the possibility of extending the investigation should the results go well. One consideration that R_s took into account was the person who was to supervise the project. "...There were some members of staff that I felt I couldn't work with..." R_s said that to work alone and go to see the supervisor when

PROJECT CHOICE

R_t comments	R_s comments
always from the supervisor. Students in this school usually have had project experience on placement where there are few, if any, problems with resources. The difference between placement and university projects can be quite startling and is an important point for them to appreciate.	necessary was the best type of arrangement for a project. "...I'm not the sort of person who wants to have someone looking over my shoulder all the time. In fact it puts me off...." Some of the projects offered were far too complicated, according to R_s, but luckily everyone in the group chose a different one so no conflict occurred over choice of projects, which some of the students had anticipated.

DEVELOPMENT AND PROGRESS

R_t comments	R_s comments
R_t says that R_s made a slow start to the project, but has discovered that it is a year group problem. All the students seem to be working on their projects only when it is timetabled which is a matter of concern to all the staff. It is not unreasonable that the students should work to some sort of timetable, but what they fail to appreciate, according to R_s is that their job opportunities, in the research field survey, are very much dependent on the reference they get, usually from their supervisor. The supervisor is very much influenced by the enthusiasm shown by students and by placing toomuch emphasis on the marks time ratio they could well be doing themselves a dis-service. R_t is not entirely sure that this applies to R_s who is coping well	The project has got off to a very slow start. R_s has been annoyed to find out how long it can take to acquire the right sort of equipment, very different from placement experience where everything was too hand. Once the apparatus was assembled there was still the problem of making it work. According to R_s the main piece of equipment, which required some modification was somewhat tempermental and liable to break down at anytime. R_s did say that the problems being encountered with equipment were similar to those experienced by many other students in the same group. The help that is given by the technicians was very good says R_s, though they seemed to be overwhelmed at times by project students. R_s only "bothered" R_t when there was an obvious problem, preferring to get on with the project alone, though the assistance from R_t was always

R_t comments	R_s comments
with the project and with the difficult techniques that have had to be mastered before results can be obtained. R_s is being very careful, which is not a bad thing, but accounts for the slow progress. R_t believes that R_s will become rather frustrated, unless the rate of progress increases, because once results are achieved the scope for extending the project are exciting and should R_s not reach this stage, it would be most disappointing for both of them. The problem with project students according to R_t is that they do not realise how much time it takes to do experiments when nothing is actually specifically set up to do. When they go on placements the students often go into experiments that have either been running for years or are in the process of being set up, all the preliminary work having been	useful and constructive. R_s had hoped to get more results than actually were produced and was rather disappointed that there was not enough time to extend it in the way it had been hoped. This was due to the slow start, as R_s said if the project was to begin again then R_s would know exactly how to go about it and what to do. "I would have liked to have completed my main experiments earlier and to have followed them up .... its useful experience". R_s found writing up easier than expected, though the lack of available literature made the theoretical basis more difficult to establish. R_t gave guidance on the report and much to R_s's surprise did not suggest many changes to the draft.

R_t comments

done and they go in and churn out results, its very satisfying for them. But that is not how university projects tend to work, there is the time consuming process of getting equipment together. In the case of R_s there has been one piece of apparatus that has had to be worked on for longer than R_t expected, nevertheless, the progress that was being made, though slower than might have been anticipated was satisfactory and thorough. The essenœof the work that R_s carried out was competent, careful and reliable, but, say R_{t1}, not enough has been done to have really conclusive results. Had time allowed, the experimental work could have been extended to allow really positive conclusions to be made. R_t is of the opinion that R_s would have preferred to have done some sort of outside field work as part of the project rather

R_t comments

than being in a laboratory all the time, as has been the case. Unfortunately such projects are not feasible in winter.

It is possible that R_t should have put more pressure on R_s in the early stages, but qualifies that statement by saying that the transition back to university life, lectures, seminar essays and projects, after placement is somewhat difficult so in all probability such pressure would have been inappropriate.

STAFF/STUDENT RELATIONSHIP

R_t comments	R_s comments
During the project staff get to know the students, who they are supervising, well and learn their capabilities. R_t comments that it was a fault with the course in Bath (referring to school R) that it is more research than theory orientated, but it has been changed by putting more theory into the final year, thus bringing it into line with other universities. Because of this the students generally were under more pressure at the start of the project due to other work which is probably why most of them got off to a very slow start. R_t was satisfied with the approach R_s made to the project, but was surprised to be asked about some of the things with which R_s needed help. The care and competence that R_s showed	R_s chose the supervisor as well as project topic believing it to be essential that student and supervisor should get on well. Early on in the project R_s said that the choice made of supervisor was a good one, and they were getting on well. If R_s cannot cope with something then R_t is called in to help, otherwise R_s does not bother him. R_s did say: "I feel a bit embarrassed at times when I can't do something on my own, but he's always really nice about it". The fact that R_s wanted a project which would give experience in setting up experiments and working out the methods available was known to R_t probably made him rather tolerant of the somewhat trivial mistakes occassionally made by R_s. R_s was aware of that this leniency only extended to the apparatus - not to the 'real work'

STAFF/STUDENT RELATIONSHIP

R_t comments	R_s comments
were without question in general but occasionally R_s was "all fingers and thumbs" and could do nothing right with the experimental apparatus. R_t was surprised at the triviality of some of the problems. Despite this there was no necessity for R_t to have to encourage R_s to work on the project, R_s was very keen and full of enthusiasm and the practical ability exhibited did improve as the project went on. Summarising R_t said that R_s was careful and competent with a sensible approach to tackling the problems encountered, perhaps too ready to call for help, but not expecting everything to be handed on a plate.	of the project. Overall R_s got on well with R_t commenting: "....What ever I did he didn't loose his cool....". At every stage R_t was helpful and R_s felt it was possible to depend on him whatever disaster befell.

ASSESSMENT

R_t comments	R_s comments

R_t marks projects on a four point scale (i) how results have been integrated into the literature: (ii) how the student has analysed and treated the data: (iii) how students overall strategy and experimental design has been approached: (iv) for actual perseverance etc.

On this scale part (iv) can give roughly 25% of the marks so it is worthwhile a student battling on for that reason if no other. This marking scheme is going to be adopted by the school and quite a lot of staff say that they use it now.

Though R_t says this scheme is not perfect, it is preferable to just giving an overall mark without considering the various sub-section of a project.

Considering the assessment of R_s's project and final report R_t made the following observations. It was a

R_s knowns that the project is worth about 20% towards the final degree, but is not altogether sure of the emphasis that staff put on it. It is rather worrying, says R_s, when there are continuing problems with equipment and other materials that are unavailable. R_s does not have these problems, but colleagues do and it is frightening to think that marks are disappearing through no direct fault of the student.

As far as gauging the attitude of students towards experimental work, R_s thinks that supervisors would have problems as they are not usually in the laboratory when such work is in progress. R_s is rather disappointed about not being able to extend the project and says that if it was being started again there would be no problem in completing the basic experimentation and extending it. However, despite this R_s was surprised how well R_t received

ASSESSMENT

R_t comments	R_s comments
competent piece of work answering much of the question asked, but showing little initiation and fasination to explore the question further. There was ample time to extend the work. R_s did not record all the detail of experimentation that was possible so that there were crucial bits of information lacking in the report, which left some sections unnecessarily vague. This led to some frustration for R_t and, he believes, for R_s too. The analysis was thorough and complete for the data actually presented and the literature review generally compentent and succinct considering the volume and confusing nature of the material available. Some lack of appreciation or explanation of points important	her report. Apparently very little alteration was needed. R_s made the final rueful comment: "I could have done better".

R_t comments

to the understanding of the project was evident. This last point was picked up by the internal assessor, said R_t. The internal assessor also marks the project before it passes to the external examiner. There is a viva which may well involve the project.

It was not possible to find out the actual mark that R_s received for the project but R_t indicated that it would be of 2(i) level, and in fact, R_t gained a 2(i) degree.

HAS ANYTHING BEEN GAINED?

One of the main reasons behind a project in the final year is, according to R_S, to give the students an insight into research, to plan a series of experiments, rather than just one, and to be able to modify and/or extend them in the light of the results obtained. R_S did not manage to get to the last stage and feels she has missed out on a potentially useful area of the project. The experience of having to plan a series of experiments and learning to cope with errors and set backs is also a function of the project from which R_S feels she has benefitted. Along with others in her year group R_S has tried to think of an alternative to a two term project which would give a similar sort of understanding of research work, but they came to the conclusion that there is nothing quite like a project.
R_S enjoyed the project and believes she is a more capable person in a laboratory than she was before doing the project. Since that was one of the goals that R_S had in mind when choosing the project, then to at least that extent the project served its purpose.

OVERALL IMPRESSION

From talking to R_t it was clear that he was most concerned that students should get as much as possible out of their projects. He tried to offer original topics, or one's using novel techniques. This attitude came over to his project students, particularly to R_s, who chose a topic that would broaden her laboratory experience, she felt it was a weak area in her capabilities, as well as being an introduction to research work. The relationship between R_t and R_s was very good, even though R_s was embarrassed about having to ask R_t trivial questions at times this did not appear to have an adverse effect on the way they worked together. Both student and supervisor were rather disappointed at not being able to extend the project further because of lack of time. R_t said that perhaps he should have pushed R_s harder at first, and one can only agree with him. The early difficulties arose because R_s, on her own admission was "all fingers and thumbs" and very ham-fisted with the experimental equipment. Another case where closer supervision in the very early stages would have been most useful.

In fact R_s did do all that was asked in the original project topic, but not as conclusively as both R_s and R_t had wished. The overall performance of R_s was careful and competent and the report was well written and presented.

CASE STUDY

S

79/80

INTRODUCTION

Student S_s was the weakest academically of S_t's project students, but showed a great deal of enthusiasm and initiative towards the project. Had it not been for the project the capabilities of S_s in this direction would not have been uncovered, but as well as showing strengths the project also highlighted S_s's weaker points.

STANDARD PROJECT DATA

Project Duration	2 terms
Timetabled hours	308
Possible Marks Final Year	31%
Possible Marks Degree	20%

TIME SPENT BY STUDENT

W/Ending	Reading	Writing	Exptl.	Talking to Sup.	Talking to Students	Totals
21/10	4.5		10.5	.5		15.5
28/10	3.5	.5	16.0	.5		20.5
4/11	2.0		14.0	3.0		19.0
11/11	2.0		15.0	.5		17.5
18/11	1.0	1.0	15.0			17.0
25/11	3.5		8.5			12.0
2/12		5.0	5.0	1.0		11.0
9/12	2.0		13.5			15.5
16/12	.5		20.5			21.0
13/1	17.5		3.0			20.5
20/1	15.5		18.0	.5		34.0
27/1	12.0	3.0	11.0	2.0		28.0
3/2	4.0	1.0	10.5	.5	1.0	17.0
10/2	4.0	1.0	7.0			12.0
17/2	8.0	2.0				10.0
24/2	19.0	16.0				35.0
2/3		35.0				35.0
9/3	4.5	8.0	8.0	2.0		22.5
23/3		3.0				3.0
Totals	103.5	75.5	175.5	10.5	1.0	366.0

PROJECT CHOICE

S_s comments	S_t comments
There were two factors involved in S_s's choice of project. Firstly the particular topic offered by S_t involved one of her main subject interests and secondly the fact that S_t was the supervisor. S_s was sure that she would work well with S_t and would be allowed to develop the project in her own way. S_s did not want to be supervised by someone who would be continually pestering and trying to guide the project in their own way. Another plus for this project in S_s's mind was that some outside field work was required.	This particular project arose from a suggestion seen in a recent paper. It is difficult to come up with original topics every year, but whenever possible S_t does try to offer at least one new topic. Whether or not this project will be successful is impossible to say, but there is potentially enough work in it to occupy an enthusiastic student.

DEVELOPMENT & PROGRESS

S_s comments	S_t comments
The equipment used by S_s on her project was very simple, and there were no problems in getting it together and setting it up. S_s had had placement experience of projects which was useful, though, as S_s commented, on placement students are rather spoilt as any equipment can be had for the asking which is very different from university. Because of the simple nature of the equipment used and the originality of the topic, S_s was free to work when she liked, there were virtually no restraints. It was possible therefore, for S_s to obtain results quite early, compared to her colleagues doing other projects. Some disappointment ensued from the early results, which all proved negative, but S_s checked out her technique improved its	S_t was delighted with the way in which S_s tackled the project, the enthusiasm and initiative shown got her off to a really good start. S_s on her own initiative evaluated the effectiveness of her technique and subsequently modified it to improve its efficiency. Information that S_s collected from various public bodies also came in useful in the investigation and again was obtained purely on her own initiative. The decision to have samples studied by electron microscope and to take photographs were all taken by S_s. Though she has not shown any great flights of imagination intellectually S_t is of the opinion that S_s is an exemplary worker whose initiative and ability to do a job would

	S_t comments
efficiency and repeated the experiments - still with negative results. As S_s remarked it is as useful to get negative results as positive, it proves the idea wrong. In order to see if the results she had got were just a local phenomena S_s collected samples from other areas. These showed the same results. S_s decided to look at a different feature of the project and extend the work to the use of the electron microscope. Whilst keeping S_t informed of all that was going on in the project S_s directed the project in the way she wanted and made all decisions herself. As a result of electron microscopy S_s was able to take photographs of her samples and also to identify clearly what she hoped to find in her experiments.	not have appeared had it not been for the opportunity offered by the project. There were points that S_t criticised. S_s was of modest academic ability in a particularly bright year, and though she unearthed some very interesing reference they were not fully discussed in the report. According to S_t this is typical of people who are of lesser curiosity and imagination. All the results obtained were very clearly recorded and presented, but no effort was made to comment on the points raised by these results, a student with a more inquiring mind, said S_t, would have managed to say quite a lot. S_t was not really surprised at the way the report turned out, from S_s's record it was

DEVELOPMENT & PROGRESS

S_s comments	S_t comments
S_s was able to work very independently on the project and consequently she did a lot of work in the early stages which meant she was able to write up her report well before the end of the second term. S_s said that she did this deliberately to give herself plenty of time for revision.	as he had anticipated, though the presentation was excellent.

STAFF/STUDENT RELATIONSHIPS

S_s comments	S_t comments
When choosing her project S_s knew that she wanted a supervisor who would not be standing over her all the time and who would let her develop the project in her own way, but who would be readily available if help were needed. S_s felt that she could work well with S_t and that he fulfilled the criterion already mentioned. In practise, S_s was well pleased with her supervision. S_t was there when needed, but otherwise kept in the background. S_s did say that perhaps S_t could have been a little more encouraging, but that it did not really bother her at all.	S_t stated that he seemed to get on remarkably well with all students with whom he came into contact. Regarding S_s in particular S_t was very pleased with her attitude towards the project and the way in which she carried it out. The enthusiasm and initiative shown by S_s at certain stages of the project were exemplary, said S_t. It was unfortunate, but not unexpected, that not all aspects of the report were approached in the same way.

ASSESSMENT

S_s comments	S_t comments
S_s was aware that the project was marked by her supervisor and an assessor, but did not know who that would be. According to S_s the project is worth about 25%.	The project report is marked by a second assessor as well as the supervisor. It is up to the assessor to consult the supervisor if necessary. When acting as an assessor S_t always does speak to the supervisor to try to determine how much help the student has received. When assessing a project S_t grades it under the following headings: 1) Lucidity of writing; 2) Adequacy of literature review; 3) Technical ability in experimentation and reaction to set backs; 4) Rationality of interpretation of results; 5) Originality of thought evident in 3) and 4). This method of assessment is in the process of being adopted throughout the school. The style in which S_s presented her report was not greatly to S_t's liking, it was jerky and

HAS ANYTHING BEEN GAINED?

S_s comments	S_t comments
S_s does not think she has gained anything specific from doing the project. To her it was just another part of the course to be completed to the best of her ability. That does not mean S_s did not enjoy doing the project, she did, but having done project work on placement, she found the difference at university frustrating, even though the equipment she required was very simple. The need for something 'different' in the final year is important, said S_s, and the project fills this role. If S_s had been interested in going into research she thinks she would have got more out of the project, but then, she said she would not have done the same topic.	S_t is of the opinion that S_s has learnt a great deal from doing this project, particularly about report writing, thought it would not be possible to change her style of writing over-night, some improvement was noticeable. The strengths and weakness that S_s exhibited S_t hopes have been classified in her mind and will be of benefit at a later date.

ASSESSMENT

	S_t comments
	disconnected. The discussion of the literature was not really sufficient and S_t says that the reader is left with unanswered questions related to both the literature and the reported results. The presentation of the results could in no way be faulted and the experimentation was done entirely to S_t's satisfaction. S_t says that S_s is a natural 2.2, and that the lack of finish in the discussion was not unexpected. S_s was awarded a 2.2.

OVERALL IMPRESSION

Having had good experience of projects on placement S_s had a fair idea of the type of topic she was looking for. One where she was independent of virtually everyone - even her supervisor. She was lucky to find just the sort of topic she wanted with just the right type of supervisor, and was therefore able to carry out the project just as she wished. S_s wanted to complete her project well in advance of the date set for handing in the final report and planned the work accordingly, as can be seen from the 'Break-down of Student Time'. Perhaps S_s could be criticised for being too independent of her supervisor. She would possibly have been given guidance on writing the discussion section of her report, criticised by her supervisor, had she not been so determined to finish early and in the way she planned. S_t cannot be criticised as he was available for S_s to consult whenever she wished, and was favourably disposed towards her attitude to the project. Although she may have gained so much from the projects she did on placement, that the university one was superfluous, it is to be hoped that S_s did get soemthing out of doing her project.

CASE STUDY

T

78/79 and 79/80

STANDARD PROJECT DATA

Duration of Project	5 weeks (3rd term) + literature survey (1st or 2nd term)
Possible Marks Final Year	22.85%
Possible Marks Degree	16.89%

INTRODUCTION

The project followed in this case study is carried out by groups of five or six students. The fine detail of the problem is different for each group, but the overall topic is the same. There is no student choice involved at all. Students from each group were followed through the project. There is one overall supervisor for the project, T_t, although other members of staff are closely involved.

STUDENT TIME

Since most of the project is concentrated in five weeks within the summer term to the exclusion of all other work it was not thought necessary to ask the students to keep a record of hours they spent working on their project. Many of the students commented that they stayed in their project room most of the night and at weekends. By no means were they working say from 9 to 5.30 only.

PRE-PROJECT THOUGHTS T_S

In both first and second year of their course the students have a project to do. The first year one is very straightforward and no special time is set aside for it, but the second year project is more intensive and lasts for one week. All students said it was very intensive.

> ".... There were guys staying up till 3 in the morning to keep up with the work.... there was an awful lot of stress on the student - I think its designed to be like that...."

> ".... This sort of thing doesn't happen in industry - its too condensed....."

The students then went on to say that they did not think the final year project would be quite so bad:

> ".... perhaps not so intensive as its over five weeks...."

> ".... I don't see any way it can be as concentrated as the second year as it's just not possible for people to stand that...."

It was also said that the final year project would be more detailed, but

> ".... you can't design in five weeks when it takes industry a year and a half to do ...."

> ".... it all depends on the problems we meet, and there's no way of predicting them...."

There is an individual design part of the project for which each student has to do a literature survey. In the year 78/79

the literature survey was done in the second term which the students found very time consuming and difficult as they also have a experimental project to carry out and write up over the same period. Typical comments were

".... it's just too much...."

and ".... its quite hectic and its all marks...."

In the 79/80 group the literature survey was carried out in the first year. The students were happy to have this time change but were not sure about the necessity of doing such a large literative search seems to be required of them

".... most people have done in excess of 10,000 words on this (literature survey) for 1 or 2% of our degree. You can get more by revising for exams really...."

".... we're not saying the project is wrong, its a good idea, but this particular part we're a bit dubious about...."

".... There's not an awful lot of point in writing it all out on paper to look neat.... it would be better to get the books.... and photocopy it... .. it would be just as good...."

Despite these reservations all the students thought that the project was a good idea

".... its bringing together everything we've done in lectures and things...."

".... The idea is O.K. but it seems to be out of proportion to the other subjects...."

".... this project..... seems a bit disproportionate - it's something to do with recognising qualifications ...."

".... You couldn't do a project of this type on your own, there's so much to consider. I enjoy working in groups...."

".... The design project is good in that its' similiar to industry, but too condensed...."

The project time was divided in two. The first 2½ weeks were spent on the group design, the second 2½ weeks on the individual design. One comment nearly all the students made was that there was no breathing space between the exam and the start of the project.

> ".... We're working at least 13 hours a day, there's been no time to recover from the exams - there needs to be a reorganisation of the timetable of events such as finals and project to give us a break...."

At two points in the project there is a visit from an industrialist familiar with the design the students are working on. The purpose of the visit is for the students to explain what they are doing and why and to get help and advice from the industrialist. There were mixed reactions to these visits.

> ".... its useful in pointing you in the right direction, especially if you've got a specific problem...."
>
> ".... they (the visits) were a pain becuase so much preparation had to be done and they didn't warrant it...."

The industrialist saw the groups individually, but in discussion after the visits some of the students said that he had contradicted himself in what he said to the different groups, but this may have been due to a difficulty of communication. There is no doubt in the students minds that the visit had some use, but comment from both year groups were

> ".... it might have been better if it had been more informal - if he'd come into the project room and wandered around...."

".... We're wasting time going over there, it would be better if he came here, there's basically the same problems in all groups...."

Once the group design had been completed some students found it difficult to start up again with the individual design. By this time they were all very tired, and looked it. Those who took a couple of days off before starting on the individual design seemed to settle again quite well. Again the relevance of the literature survey came up, a number of students said they had not used their survey at all because they were too general - but that was what they were told to do. One comment was

".... until you get into the project you don't know what information you will require...."

Another point made, by a few students was the time factor.

".... There's not enough time to do things properly, so we have to take short cuts and the answers don't mean a lot...."

".... you'd check your calculation and find an error, but there's not the time to change it, so you try to cover it up. Its not very satisfying...."

Most students were satisfied with the help they received from their individual supervisors, but as one student said

".... I'm happy with the one I've got. I should imagine there are one or two people who aren't too happy...."

Despite claims of exhaustion and lack of time the individual design reports were handed in on time.

ASSESSMENT

STUDENTS COMMENTS

None of the students knew how their project would be assessed, one or two assumed that it was done by the staff they had been involved with. They all were aware of the worth of the project towards their degree, but some had reservations about the necessity of such a thorough literature survey as is required when that section is worth so little towards their degree.

SUPERVISOR COMMENTS

The assessment of this project is divided into two areas. The group work is assessed by T_t and other members of staff and a mark is given which is the same for each member of the group. The literature survey is marked by an assigned supervisor and the individual design by at least two assessors. In the individual section each student has a separate mark which is worth up to 75% of the whole project mark. The performance of all the students, groups of individuals, was good, with the odd exception. The range of marks for projects tends to be fairly narrow, between 60 and 75%. This is only to be expected

SUPERVISOR COMMENTS

when the students are working in groups and there is interaction between the groups. T_t believes that working in such an atmosphere tends to improve the standard of work produced.

HAS ANYTHING BEEN GAINED

Having completed a design project of this nature and been awarded their degrees the students involved in this case study will have gained exemption from some of the examination leading to membership of their professional institution In that respect the project was good for all the students. The experience of working in a group was mentioned as a good feature of this project.

> ".... it's similiar to industry, but too condensed...."

> ".... Practise in working with a group - that was one good point about it...."

Another point raised was the responsibility to others that group projects engender:

> ".... You had to come in or you felt you were letting others down - on your own.... its only you losing out...."

The concensus amongst the students was that the project was useful experience for their futures, when hopefully, many of them would be working in design teams, but that the intensity of the work required was such that there should have been more of a break between their exam and the start of the project.

OVERALL IMPRESSION

Of all the projects studied this is the only one with a direct relevance to exemption from examinations leading to membership of a professional institution. Not only does it require that the student do what is asked of him, but also requires concentration and stamina beyond the expectation of the student. The format of the project is laid down by the professional institution, and overall it is regarded by the students as an interesting and useful exercise. The outside observer may wonder if it is necessary for the students to drive themselves as hard as they do - or are they just doing so because previous final years have done so? No definitive answer can be given to that question, but another question that it raises is could the pattern of events not be changed a little to allow a break between exams and project, or is this a deliberate ploy?